INVESTIGATING RELIGION AND COMPUTING: A CASE FOR USING STANDPOINT THEORY IN TECHNOLOGY EVALUATION STUDIES

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INVESTIGATING RELIGION AND COMPUTING: A CASE FOR USING STANDPOINT THEORY IN TECHNOLOGY EVALUATION STUDIES

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SUMMARY

This research focuses on the development and study of Information and Communication Technology (ICT) that support religious practices and the use of standpoint theory in ICT evaluation studies. Three phases makeup this work: formative studies to understand how megachurches, their members and leaders use ICT in ways tied to their Protestant Christian faith and the design of a technology probe, a photo sharing website named ChurchShare. The final and most significant phase is the evaluation of this probe in two churches.

I deployed ChurchShare in a Christian church comprised of U.S. born individuals and argue this initial deployment took place with "ideal users," or those I intended to use the application and who represent the traditional targets of HCC (Human-Centered Computing) research. More than 200 photos were uploaded to ChurchShare and findings suggest that the technology probe was successfully integrated into the church's worship services. Standpoint theory guided the second deployment study that was conducted with individuals who are marginalized in HCC research—Kenyan immigrants. Participants rejected ChurchShare and zero pictures were uploaded to the website. I compare findings from both deployments and conclude that conducting ICT evaluation studies with marginalized users leads to more objective findings than conducting such studies with ideal users. I end with a discussion describing how standpoint theory can be incorporated into HCC, focusing on how this approach offers a practical way for researchers to uncover value differences between themselves and the people who interact with their work.

CHAPTER 1: INTRODUCTION AND MOTIVATION

More than ever before the world we live in is both multicultural and global. Yet, computer scientists and technology developers' vision of the future is described as "dated," "very American," secular and arguably shaped by the *standpoint* of those charged with creating the next generation of computer applications and devices (Bell, 2006a; Bell & Dourish, 2007). The differences between this vision and social changes, such as globalization and modern society's reluctance to reject religion, pose an interesting question for Human-Centered Computing (HCC)[1] research: How do user groups who are traditionally overlooked in computing research use Information and Communication Technology (ICT)[2] differently from users who are the targets of computing research and development? In this dissertation, I use religion as a lens to investigate this question and argue that by applying the logic of standpoint theory to ICT evaluation studies, designers can more deeply understand how to design for marginalized user groups.

Religion is a useful lens because it remains important to billions of people worldwide and shapes their attitudes towards technology. Reports estimate there are 2.1 billion Christians, 1.2 billion Muslims and 800 million Hindus worldwide. These numbers challenge the prediction that modernity would lead to secularization (i.e., societies migrating away from close identification with religious institutions) (Barret,

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[1] Throughout this dissertation, I use "HCC" to refer to the following fields focused on technology and human experience: Human-Computer Interaction (HCI), Computer Supported Cooperative Work (CSCW) and Ubiquitous Computing (UbiComp).

[2] Throughout this dissertation, I use "ICT" to refer to all communication related technologies, including the Internet, email, SMS, telephones, televisions, radios, and mobile phones.

Kurian & Johnson, 2001; Berger, 1999). Practitioners of these faiths rely on ICT to seek, find, produce, share and consume religious and spiritual information. For example, Muslims use their mobile phones to prompt them to their five daily prayer times, Catholics receive the Pope's daily thoughts via SMS, and Hindus attend "virtual temples" (2006; Gorman, 2009; Katz, 2006). Further, research in the United States (U.S.) indicates that more people use the Internet for faith-related purposes than have used Web auction sites, traded stocks online, done online banking, or used Internet-based dating services (Hoover, Clark & Rainie, 2004). Collectively, these findings indicate that rather than being at odds with religious practices, technology continues to support the various ways groups and individuals worship a higher being.

Yet, religion remains a topic HCC researchers tend to shy away from, which is surprising because the topic touches on issues that are central to these research communities. For example, investigating religious uses of ICT highlights novel ways to imagine technology design (Gaver, Blythe, Boucher, Jarvis, Bowers & Wright, 2010; Wyche, Caine, Davison, Patel, Arteaga & Grinter, 2009a), points to understudied user groups (Sterling & Zimmerman, 2007; Woodruff, Augustin & Foucault, 2007; Wyche, Magnus & Grinter, 2009b) and provides a lens for understanding how immigrants stay connected with their countries of origin and create new communities abroad (Burrell & Anderson, 2008). Imagining new ways to design ICT and understanding the needs of more diverse users than have traditionally been observed within HCC research communities is crucial because the contexts where ICT is used and the people adopting it are more diverse than ever before.

Further, accelerated movements of technologies, finances, and cultural migrants have generated an understanding of place and community that can no longer be considered in purely local terms. However, HCC research tends to focus on western, local, and place-based scenarios, overlooking the new forms of interconnectedness resulting from flows of capital and labor, especially with regard to immigration from sub-Saharan Africa to the U.S. (Srinivasan & Pryati, 2007). My multi-sited research approach and deployment of a technology intervention in a Kenyan immigrants church is a first step in addressing this gap in HCC literature. More broadly, my studies of religion, churches and Kenyan immigrants provide insights into how marginalized users adopt ICT and highlights how alternative *standpoints* can inform *ICT* design. Though scholars disagree about the precise definition of standpoint, I use a definition most relevant to my dissertation and that draws from Harding's research (1991). A standpoint is more than a point-of-view or one's perspective, it also includes what an individual (or group) chooses to focus on and obscure.

Every "objective" view has a standpoint or is shaped by individuals' history, culture and worldview. Standpoints influence our perceptions of the world around us and some scholars contend they also significantly shape the types of problems asked in research communities, topics of study and what is valued as "good research" (Harding, 1991). Noted philosopher, Sandra Harding extends prior work examining standpoint theory to critique objectivity in science. She claims science is built on and socially legitimated by the claim to objectivity or an understanding that scientists' perceptions are not colored by bias and value-free. However, Harding convincingly argues that scientists' notions of objectivity are weak, because they fail to account for scientists' and their

communities' standpoints. In the process of conducting research, scientists fail to reflect on how their social positions and the shared values in their research communities color the questions asked, methods chosen and analysis of outcomes. Inevitably this leads to "weak objectivity" because you can not delete how a scientists' standpoint biases their results.

Discussions about objectivity also exist in HCC research communities. For example, Buxton and Greenberg (2008) argue that quantitative evaluations are the "status quo" in HCI, yet they are weak because findings from these studies are rarely replicated. Bardzell (2010) argues that applying feminist theory to evaluation studies, designers can make visible ways that design configures users as gendered subjects, thus strengthening objectivity in evaluation studies. Sengers (2005) and her colleagues comment less on objectivity, but encourages researchers to reflect on how technology perpetuates negative trends (e.g., gender stereotypes) and to imagine alternative ways ICT can support daily life. Standpoint theory suggests increased reflection among researcher can lead to "strong objectivity" (Harding, 1991). By examining a topic—religion—and deploying a technology intervention with Kenyan immigrants—I hope to further discussions within HCC research communities about objectivity in ICT evaluation studies by calling for increased reflexivity in the research process. Specifically, I suggest standpoint theory can contribute to this discourse.

1.1 Motivation

Computer scientists have generally kept their distance from religion and spirituality. Thus, a brief discussion about why I choose to study this topic within HCC is important. Further, given that my larger argument in this dissertation regards integrating

standpoint theory into HCC it is imperative that I be transparent about my reasons for pursuing religion and computing as a research topic. In later a Chapter I present a reflexive analysis of my standpoint.

Within HCC and related disciplines, researchers tend to examine topics arguable shaped by their standpoint and ignore ones that are not. Until recently, HCI, CSCW, and UbiComp researchers conducted empirical studies examining individuals who broadly resembled members of the community. In others words there are a myriad of studies examining users who are white, tech-savvy, highly educated, and living in the western-world (Bell, 2006b; Djajadiningrat, Gaver & Frens, 2000).[3] Although there is ample evidence suggesting these users are religious (it is widely recognized that the U.S has a high percentage of its population actively practicing a religion as well as a high degree of technology ownership (Giddens, Duneier & Appelbaum, 2003)) users' faith is understudied in HCC. Researchers from fields that share intellectual roots with HCI suggest this is because religion is less central to academics' personal lives compared to the public as a whole (Shafranske, 1996) and religion are mistakenly assumed to fall outside the scope of scientific study (Thomson, 1996). Thus, one way to explain the omission of religion from computing research is that is it is not of part of theses communities' standpoints.

Studying characteristics that are important to technology developers and overlooking ones that are not parallels a larger trend among designers and researchers to (often unconsciously) imagine end users who resemble them in terms of their experiences

[3] Notable exceptions to this trend is research investigating how to design ICT for older adults and people with disabilities.

and contexts. Madeline Akrich describes this as "I-methodology" (or the reliance on personal experience) whereby the designer replaces his professional hat by that of the layman (Akrich, 1995). Prior research in HCI, CSCW, and UbiComp disciplines has lead to many notable technological innovations and knowledge about how people and groups use technology. However, it only recently that researchers in these communities have turned their attention to "thorny" topics surrounding ICT use and design, such as post colonialism (Irani, Vertesi, Dourish, Philip & Grinter, 2010), feminism (Bardzell, 2010) and religion (Bell, 2006a). Such topics force the community to imagine new users and uses of ICT than have traditionally been observed. Further, these recent efforts prompt HCC researchers to begin to reflect on their identities (whether it be male, white or atheist) and how it impacts what topics are pursued (and not pursued) in the community. My dissertation draws from and builds of these recent efforts.

Finally, in my *brief* research career I have chosen to study people who are very different from me—whether they are older adults (Wyche, 2006b) or Charismatic Pentecostals (Wyche et al., 2009b)—for three reasons. First, as the contexts of ICT use grow it becomes socially important to develop technology that acknowledges the diversity of people who use it. Second, understanding experiences that are vastly different from your own can inspire novel design ideas (e.g., (Djajadiningrat et al., 2000)). Lastly, there is personal self-interest. Compare evaluating computing applications with African immigrant communities to doing the same with tech-savvy college students. The former is simply a more interesting, richer and satisfying endeavor.

1.2 Purpose of Research and Research Questions

The primary goals of my dissertation are: (1) to empirically understand faith-oriented ICT use in real world settings; (2) to design a technology probe based on these empirical findings; and (3) to deploy this technology probe in different churches. I asked Protestant Christians at one church comprised of individuals who largely reflect the type of users traditionally studied in HCI research (in terms of their nationality and familiarity using ICT) and in another church made-up of individuals who have been understudied in HCI—Kenyan immigrants. I contend that this initial deployment took place with ideal users, or those that I imagined would use ChurchShare (Bardzell, 2010). The second deployment took place with marginalized users or those who have not been the traditional targets of HCC research. By comparing findings from both deployments I conclude that conducting ICT evaluation studies with marginalized user leads to more relevant and arguably more objective findings than conducting such studies with ideal users.

Religion is a useful topic for investigating differences in communities and Protestant Christian churches are a physical manifestation of these differences. Although church members share the same Christian faith, the church has been called the "most segregated institution in American society." These religious organizations' members tend to be homogenous in terms of race, ethnicity and socio-economic class (Hadaway, Hackett & Miller, 1984). Religion is also a topic that prompted me to reflect on how my life experiences affect my ability to gain access to some communities and restrict my access to others, which in turn prompted me to consider standpoint theory in my deployment studies. Finally, religion is tied to one's culture regardless of their country of origin; it is something shared among U.S. and Kenyan born individuals. Immigrant

churches are institutions where people collectively engage in practices that link them to their countries of origin. Thus religion offered a unique and useful lens for making comparison about spirituality and ICT use between different users groups.

Table 1: Research Questions addressed in Dissertation

Understanding how ICT are used to support religious practices	
What characteristics differentiate religious uses of technology from secular uses? *Claim: Using religion as a lens to understand technology use will point to factors that differentiate faith-oriented from secular use. Specifically, whereas efficiency and productivity historically drive some forms of ICT use, understanding religious uses of technology will highlight different factors.*	**See Chapter 4**
Developing ICT to support differences—First deployment study at church comprised of American-born members	
1) **What characteristics affect ICT adoption (and rejection) among church members?** *Claim: Deploying an ICT in a worship setting will highlight new factors that motivate ICT use. These factors may include a desire to increase participation in worship services.* 2) **What new ICT practices will emerge among church laity when ChurchShare is used?** *Claim: Religious individuals will use digital photography to capture "God's presence" in daily life, thus giving them additional opportunities to reflect on it and simultaneously allowing them to develop media that can be shared during church worship services.*	**See Chapter 5**
Using standpoint theory in ICT evaluation studies—Second deployment study at African Immigrant Church	
What characteristics affect ICT adoption (and rejection) among church members at a Kenyan immigrant church? *Claim: Immigrant churches will adopt and use ChurchShare for reasons different from non-immigrant churches. Specifically, by comparing findings from a deployment at a non-immigrant church with findings from a deployment at an Kenyan immigrant church I uncover significant differences between how users who have traditionally been the target of HCC research users who are understudied within these research communities—Kenyan immigrants.*	**See Chapter 6**

1.3 Overview of Dissertation

This dissertation is divided into seven chapters including this introductory chapter: Chapter Two describes background work and related research. I demonstrate how my dissertation draws from research in HCC, Congregational Studies and Communication Studies and outline how it contributes to these disciplines in two broad ways. First, although religion has become a topic of interest in HCI and related communities, prior work in this area remains exploratory, offers little guidance on how to design ICT to support religious practices and remains focused on western users in western contexts. This limitation is notable because one reason religion is such a compelling topic is because it surfaces cultural differences between designers and users in ways that few other topics can. Second, my research contributes to prior work examining Christianity and ICT in Communication and Congregational studies by investigating how using ICT for religious purposes differs from secular uses, developing a technology probe based on factors uncovered in my research and evaluating it in different congregations. A technology probe deployment involves the introduction of an artifact or artifacts into peoples' lives to encourage reflection on existing practices and highlight opportunities for future technologies (Gaver, Dunne & Pacenti, 1999; Hutchinson et al., 2003).

In Chapter Three I present my approach to research, analysis and my methodological alignments. In this chapter, I also introduce standpoint theory and Harding's (1986, 1996) notion of "strong objectivity," approaches that guided my second deployment study.

Chapter Four details the formative studies I undertook to develop an empirical understanding of how megachurches, their members and leaders use ICT in ways connected to their Christian faith. These formative studies resulted in a discussion about characteristics designers should consider when developing ICT that supports Protestant Christian worship practices. Findings from this study also motivated a technology probe called ChurchShare, a photo-sharing website deployed in different churches. I present this chapter as an example of design research, or knowledge that can inform the development of future commercial products (Zimmerman, Forlizzi & Evenson, 2007).

Chapter Five describes an initial deployment study of the technology probe in a church comprised of American-born worshippers. I contend that this initial deployment took place with ideal users, or those that I imagined would use ChurchShare (Bardzell, 2010). Participants in this study resembled those I interviewed in the aforementioned formative studies. I describe users' experiences with the website including descriptions of the uploaded images and church members' reactions to collectively viewing photos documenting "God's presence" in the lives of their fellow church members. I also discuss the ways ministers and church members' reactions to ChurchShare confirmed and differed from the results obtained during the formative stages of this work.

Chapter Six focuses on my second deployment in a Kenyan immigrant church. Unlike my first deployment this study took place with users who have traditionally been overlooked in HCI research—Kenyan immigrants. The results presented in this chapter stand alone as interesting observations about how deploying ICT with marginalized user groups can highlight assumptions embedded in technology design, thus illustrating how standpoint theory can influence ICT evaluation studies. By comparing findings from both

deployments I conclude that conducting ICT evaluation studies with marginalized users leads to more relevant and arguable more objective findings than conducting such studies with ideal users. Findings in this chapter also point to considerations HCC researchers must account for as they investigate unfamiliar contexts and ICT practices, such as those found in developing countries.

Finally, Chapter Seven ends the dissertation with a discussion about religion, standpoint theory and ICT evaluation studies. I also outline a future research agenda motivated by research presented in this document.

CHAPTER 2: RELIGION AND COMPUTING: BACKGROUND AND RELATED WORK

In this chapter, I discuss related research and describe how this prior work motivates questions addressed in my dissertation. My work draws from a diverse range of fields. This is unsurprising because religion is a topic that spans and touches on a variety of academic disciplines. I describe how my dissertation extends research from three overlapping bodies of related work. These disciplines are: Human-Centered Computing (HCC); Congregational Studies and Communication Studies.

First, I situate my dissertation within prior HCC research (e.g., HCI, CSCW, HCI4D and UbiComp) by providing a brief history of the field. Largely drawing from HCI research, I demonstrate how researchers' interests evolved from an early focus on ICT use in controlled environments, to interest in examining ICT use in "real world" settings and recently researchers' interest have broadened to include Human-Computer Interaction for Development (HCI4D) or studies on designing technologies for developing regions. Collectively, this prior research provides a rich understanding of secular computer use with attention towards the role of religion in ICT appropriation appearing only recently. Despite current efforts to account for the role of religion in ICT design (Gaver et al., 2010) and use (Woodruff et al., 2007), research investigating how users and organizations differentiate secular from faith-oriented technology use is lacking. This knowledge is important if computer systems and applications are to be designed to effectively support religious practices. Further, prior researchers do not

incorporate standpoint theory into their research approach and I argue my use of this approach (detailed in Chapter Six) is a contribution of my work.

I also situate my research within an evolving research agenda known as and Human-Computer Interaction for Development (HCI4D), or studies focused on understanding how to apply HCI principles to the design of technologies for developing regions (Ho, Smyth, Kam & Dearden, 2010; Sambasivan et al., 2009a). Religion provides a compelling lens to understand technology use in developing regions because it highlights differences between Western and non-Western users in ways few topics can. Further, religion continues to have a powerful and pervasive presence in sub-Saharan Africa, South America and parts of Asia (Jenkins, 2007; Pew Forum on Religion & Public Life, 2006). Faith and spirituality shape peoples' attitudes towards ICT, but these topics remain understudied in HCI4D. In my dissertation I use religion as a lens to understand characteristics that affect ICT adoption (and rejection) among members of a Kenyan immigrant church, thus addressing this gap in this literature. In the process I critique the HCI, UbiComp and CSCW communities' tendency to deploy technology probes with "ideal users" and demonstrate how standpoint theory can contribute to ICT evaluation studies.

My research focuses on ICT use in worship settings, thus an overview of congregational studies and prior work examining religious organizations' use of ICT is necessary. In this section, I describe why I chose to examine churches, their leaders and members. I also present research describing how religious organizations use ICT differently than secular ones. This research motivates a key question addressed in my dissertation: What factors differentiate religious uses of technology from secular uses?

Finally, I discuss related research from communication studies examining the Internet, religion and spirituality. This research is largely motivated by scholars' desires to understand how increased Internet access changes individuals and groups' religious practices, but offers little guidance on how or if ICT should be designed differently to support these practices. I distinguish my work from these prior studies by investigating how using ICT for religious purposes differs from secular uses, developing a technology intervention based on factors uncovered in my research and evaluating this intervention in different congregations.

2.1 A Brief History of HCC

My research and other researchers examining religion and ICT use echoes a larger trend within HCI to reconsider its own boundaries (Harrison, Tatar & Sengers, 2007). I outline this transition by briefly describing how HCI research has moved beyond focusing on a single user, to multiple users and simultaneously investigating how larger social issues shape ICT use. Then I describe how this work has lead to current research examining religion, technology use and HCI4D.

In the early 1940's, the researchers at University of Pennsylvania introduced the ENIAC (Electronic Numerical Integrated and Computer) as one of the earliest electronic computers. The machine was expensive, filled an entire room, and was accessible to only a few highly trained individuals. Given this was how computers first came into being it is not surprising that Card, Moran, and Newell (1983) developed a model of interaction that only accounted for a single user, interacting with a lone computer in a controlled environment. This model known as the model human processor (MHP) framework guided early HCI research (Card, Moran & Newell, 1983). Much of this work evaluated

computer-mediated tasks using understood metrics to measure task completion rates (Hutchins, Hollan & Norman, 1985) and how to appropriately design airplane cockpits (Flanagan, 1954). The MHP framework focused on the cognitive aspects of computer use while overlooking the larger social and environmental factors that shape users' interactions with technology such as emotion, social status and access to computers (Hollan, Hutchins & Kirsch, 2000; Kaptelinin & Nardi, 2006). Since then, HCI researchers have conducted research investigating aspects of computing use not accounted for in the MHP framework.

Situated Action (SA), Distributed Cognition (DCog), and Activity Theory (AT), emerged as responses to human-information processor theory and provided frameworks HCI researcher could use to explore a broader ranges of factors shaping humans' interactions with computers (Hollan et al., 2000; Nardi, 1996; Suchman, 1987). Though the foundations and details of their implementation differ, what these frameworks share is an understanding that users are a part of larger socio-technical system. Unlike MHP, SA, DCog, and AT incorporate the social and cultural *with* the cognitive. This is significant for two reasons. First, it suggests that cognition takes place "in the head" as well as "outside the head," thus highlighting contextual factors role in ICT use. Second, it points to a wider range of research methods HCI researchers can use for understanding and evaluating technology use outside of controlled settings. Indeed, positivistic approaches did not allow researchers to gain the holistic understanding about users' relationships with ICT in less-controlled environments such as the workplace, home and churches.

A leader in this new area of HCI research was anthropologist Lucy Suchman (1987). She challenged the epistemological stance underlying positivistic approaches to

research and argued for a "situated approach" to understanding users' experiences with technology. Her studies examining users' interactions with a Xerox machine's interface were instrumental in motivating widespread use and acceptance of methods and methodologies drawn from anthropology, the most significant being ethnography (Hughes, King, Rodden & Andersen, 1994; Hughes, Randall & Shapiro, 1992). In turn, HCI saw growing participation from social scientists conducting situated studies of users' interactions with computer interfaces in office settings (Rouncefield, Hughes, Rodden & Viller, 1994). Further, employing qualitative methods such as participant observation and interviews became increasingly accepted methods within HCI and related research communities. I use these approaches in this dissertation.

At the same time, methods requiring researchers partner with users to design ICT became more commonplace within HCI, including cooperative design and participatory design (Olson & Olson, 1997). Participatory design originated from the Scandinavian democracy movement and practitioners of this approach emphasize mutuality and reciprocity between researchers and participants (Muller, 2003). For example, Bødker, Knudsen, Kyng, Ehn and Madsen (1988) made specific references to "the mutual validation of diverse perspectives" when describing their use of participatory design methods (Bødker, Knudsen, Kyng, Ehn & Madsen, 1988). Thus, like Suchman's work the advent of participatory approaches to design inspired researchers to conduct studies examining a broader range of social factors and their impact on ICT, such as differences between designers and users' attitudes towards technology. Greater acceptance of participatory methods also represents an initial step by HCI researchers to account for different worldviews in the research and design process (Gaver, Hooker & Dunne, 2001).

Studies examining multiple users' interactions, networked devices, and new software applications demonstrated that ICT developers must consider an even wider range of factors than they had previously accounted for when developing systems (Dourish, 1995; Ehrlich, 1987; Hughes et al., 1994). In addition to design and cognitive factors, research exploring "groupware" or collaborative software applications, demonstrated that economical, motivational, and political factors also underlie users' interactions with computers (Grudin, 1990). As the computer continued to "reach out" so did researchers' interests, although these remained confined to studying ICT use in Western settings and on secular uses of technology. Growing attention was devoted to studying computers outside of the workplace, the most notable new setting being the home.

Researchers recognized that domestic settings were unique environments with priorities and concerns not evident in work environments (Crabtree, Rodden, Hemmings & Benford, 2003; Hindus, 1999; Hindus, Mainwaring, Leduc, Hagström & Bayley, 2001; Rodden & Benford, 2003). In the workplace, applications traditionally supported making task more efficient and involved relatively well-understood requirements, methodologies, and ways to be evaluated (Bell, 2005; Wyche, 2006b). In contrast, people do not just pursue tasks and solve problems; they also explore, wonder, love, waste time, and worship at home (Gaver, 2001). The home became a popular field site for HCI researchers and studies in these settings inspired researchers to investigate and even broader ranges of uses and users of computing. Indeed, I trace my interest in using religion as a lens to understand technology use to prior work investigating domestic

settings. Like the home, churches are environments where productivity and efficiency are less prioritized than they are in the office.

My dissertation is a departure from early HCI research examining direct manipulation of graphical objects, gesture recognition, toolkits and secular uses of ICT. Yet, it is still aligned with HCI as the Association for Computing Machinery (ACM) defines HCI:

> Human-computer interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them (Hewett et al., 1992).

My research pushes the community to broaden its understanding of "major phenomena" to include not only secular phenomena but religious ones too. In the process I fill a gap in HCI/HCC literature by reframing the communities' standpoint using the lens of religion and African immigrants' experiences with a technology probe (Wyche, 2006a; Wyche & Grinter, 2009; Wyche, Medynskiy & Grinter, 2007).

2.1.1 Human-Centered Computing Perspectives on Religion and ICT use

Given the HCI communities' interest in major phenomenon surrounding computing, it is surprising that religion has become a topic of interest only recently because it influences how billions of people adopt ICT and highlights new design opportunities (Bell, 2006a; Campbell, 2007; Gorman, 2009). Here I provide an overview of prior research investigating religion and ICT in HCI and UbiComp, and surface questions that arise from this research that are addressed in my dissertation.

One of the first attempts to engage the HCI community with this topic was in 2001, when Muller, Christiansen, and Nardi posed the following question, "Can we have spiritual experiences online?" They believed the dominant design rhetoric in HCI (e.g.,

command-and-control; constant updates and interruptions) worked against the ambiguity and mystery some associate with spiritual life (Muller, Christiansen, Nardi & Dray, 2001). The following year Hlubinka and her colleagues at MIT's Media Lab developed "AltarNation," a tangible interface that allows physically isolated individuals to pray with larger faith communities (Hlubinka, Beaudin, Tapia & An, 2002); however the artifacts' design was not grounded in formative fieldwork examining prayer and the system was never formally evaluated. This early work was limited in its scope, but was useful in introducing the CHI community to religion and in providing a foundation for my research.

Scholarly work investigating religion and technology remained absent until 2006 when Genevieve Bell (2006) published "No More SMS from Jesus: Ubicomp, Religion and Techno-spiritual Practices." This paper prompted more discussions and research about religious ICT use within human-centered computing disciplines. Bell discusses three reasons why religion represents a significant area of interest for HCC; each reason motivates my research in this area. First, faith remains an enduring part of peoples' lives nationally and internationally. This makes religion an ideal entry-point for understanding the kind of cultural work technology performs because religion is one of the few ways large groups of people imagine solidarities regardless of geographic location, race, and class. Second, ICT increasingly supports and is changing various spiritual practices. For example, Catholics can choose to receive daily religious texts from the Pope, Jews can place a prayer request in Jerusalem's Wailing Wall via SMS, and Christians can submit online prayer requests through their church's websites. Finally, techno-spiritual repurposings are important because they point to different communities, practices and

habits that ICT be supported. Bell's work offers a useful inventory of the many ways ICT is intertwined with spirituality, offers compelling reasons why religion should be studied in HCC and is that staring point on which my work builds and greatly expands.

Bell's work inspired other HCC researchers to study how ICT support religious practices. A notable example is Woodruff, Foucault and Augustine's (2007) study of American Orthodox Jewish families' use home automation for religious purposes. To understand how religion affected ICT use, they conducted tours of families' homes and asked questions about how they used technology on the Sabbath—a day Jewish law restricts adherents from manually turning devices on and off. Woodruff and her colleagues demonstrate how re-examining assumptions about ICT use through the lens of religion can point to different ways to design technology, but lacks guidance on how their findings can shape ICT designed to support religious practices.

Sterling and Zimmerman's research explored how to design mobile applications for Zen Buddhists (Sterling & Zimmerman, 2007). They conducted a series of design-oriented interviews and observations at the Soto Zen Buddhist Community Center in Pittsburgh, PA, and used their findings to motivate a collection of design concepts for mobile phone applications. Examples include an application that allows geographically dispersed Buddhists to collectively meditate. Rather than developing a technology prototype based on their findings, these researchers created design sketches that were not built and evaluated. Real world deployments are important because they can confirm findings from formative studies and provide a deeper understanding of the complex issues surrounding religion and technology appropriation.

Gaver's recent research builds on these prior studies by pairing empirical research with the design and deployment of a device that supports the prayer practices of a group of cloistered nuns living in a convent in northern England convent (Gaver et al., 2010). Gaver and his colleagues' formative studies revealed that praying was central in the nuns' daily lives but because of their cloistered nature, they were not always aware of issues in the outside world that might warrant prayer. This inspired the "Prayer Companion," a small device, with an LED screen that is connected to the Internet. Software in the device searches for content on websites such as BBC, CNN, Reuters and the New York Times, that is relevant to prayer and displays that content on the device's screen (Figure 1). The Prayer Companion was deployed in the convent for five months and researchers concluded that materiality and openness, or attentions to a device's aesthetics are crucial factors to consider when developing ICT to support spirituality.

My dissertation is similar to Gaver's work because I also conducted empirical studies, translated findings from those studies into a technology probe and evaluated it in

Figure 1: "Prayer Companion"

a real world setting. However, a limitation of Gaver's work is that the prayer companion was deployed in a single setting. By conducting two real world deployments with users who are like those traditionally examined in HCC research in terms of race and nationality and another deployment with users who share a very different set of life experiences from me—Kenyan immigrants—I develop a broader understand of the role of religion in shaping ICT adoption and rejection.

Despite, growing interest in religion as a topic within HCC, unanswered questions remain. Specifically, there are opportunities to move the communities' discourse beyond studying religion for the sake of studying religion, to more deeply understand if using ICT for religious practices differs from using it for secular purposes and to investigate how religion affects ICT adoption (or rejection). Further, religion offers a compelling and unique lens to understand user groups who differ in terms of their countries' of origin but share similar values and beliefs, a topic explored in this dissertation.

2.1.2 Human Computer Interaction for Development (HCI4D)

My work on religion and ICT use also sits within the growing body of HCI for development (HCI4D) research or studies that focus on understanding how to apply HCI principles to the design of technologies for developing regions and how culture relates to user interface design (Ho et al., 2010). Specifying a precise scope for a review of this fast-growing and evolving literature is challenging. This review aims to emphasize work that is representative of major trends within this field and highlights research relevant to my dissertation.

To date, HCI4D researchers have conducted studies primarily in India, and to a lesser degree in Ghana and South Africa (Bidwell, Reitmaier, Marsden & Hansen, 2010;

Luk, Ho & Aoki, 2008). This scholarship tends to focus on producing technologies for underprivileged users living in rural parts and urban slums in low-income countries. Notable examples include, Kam and his colleague's research on developing language-learning games for low-income children in India (Kam et al., 2008) and Parikh's work on developing a user interface toolkit that allows a camera-equipped mobile phone to interact with paper documents for rural computing applications such as microfinance (Parikh, Ghosh & Chavari, 2003; Parikh, Javid, Sasikumar & Ghosh, 2006). Recently, researchers' interests have broadened to include studies examining mobile phones and women's health (Ramachandran, Canny, Das & Cutrell, 2010), ICT use in urban slums (Sambasivan, Rangaswamy, Cutrell & Nardi, 2009b) and on developing appropriate research methods for these new contexts (Bidwell et al., 2010).

This prior work is valuable because it prompted the HCI communities to investigate contexts outside of the "developed" world; however some HCI4D researchers contend this research is limited in two ways, prior work predominately focuses: 1) on users living in rural areas, with low income and education levels and 2) on developing technological innovations for user in developing countries, rather than understanding current practices in these regions (Heeks, 2008; Ho et al., 2010; Wyche, Smyth, Chetty, Aoki & Grinter, 2010). The second limitation arguably implies that users in developing regions *need* Western technologists to bring them technology, when in fact much can be learned about users' current practices and the innovative ways they integrate ICT into their daily lives (Burrell, 2007). Religion provides a useful and overlooked lens for understating how ICT are currently used in developing regions (Meyer, 2002; 2008).

The HCI4D community's failure to acknowledge the pervasive presence of religion in developing regions is surprising given that faith and spirituality are intimately woven into the fabric of daily life in developing regions and that the number of people who identify as Christians is growing at a rapid pace. The significance of this trend can be seen in estimates that by 2050 only about one-fifth of the world's three billion Christians will be non-Hispanic Caucasians (Barret et al., 2001; Jenkins, 2006; 2007) and in the following quote by noted historian Phillip Jenkins:

> Given the present and future distribution of Christians worldwide, a case can be made that understanding the religion in its non-Western context is a prime necessity for anyone seeking to understand the emerging world (Jenkins, 2007).

My research examining religion and ICT practices in Nairobi, Kenya, brings religion into HCI4D discourse (Wyche, Aoki & Grinter, 2008) and my dissertation research fills another gap in the HCI4D literature. To date HCI4D overlooks ICT practices of users who were born in developing countries and migrate to the U.S. Arguably this omission creates a "here" versus "there" dichotomy that restricts our understanding of how limited access to ICT is not only a global issue but also a local one. Perhaps this oversight can be attributed to the newness of the field, but like other HCI scholars I recognize that studying immigrant communities specifically those whose countries of origin are in developing regions has much to offer HCI4D (Best, Smyth, Serrano-Baquero & Etherton, 2009; Foucault, Russell & Bell, 2004; Irani et al., 2010). Further, African-immigrants' religious practices are interesting to examine because they connect those living in developing countries with friends and family living in the U.S. and ICT facilitate these interactions (Arthur, 2000). For example, my research suggests Kenyan immigrants use mobile phones to send prayer requests to friends and family

members living in their countries of origin (see Chapter Six). Burrell's work with Ghanaian immigrants also indicates that immigrants rely on the Internet to connect them with religious events in their home countries (Burrell & Anderson, 2008). Additionally, examining how ICT facilitates these connections highlights why HCC scholars should employ a multi-sited ethnographic approach in their fieldwork, similar to the approach used in this dissertation (Marcus, 1995). Studying Kenyan immigrants and their ICT practices extends HCI4D research by illuminating how ICT contributes to fluidity of cultural and transitional boundaries and motivates the following question in my dissertation: What characteristics affect ICT adoption (and rejection) among Kenyan immigrants?

Finally, I hope my use of standpoint theory in technology evaluation studies contributes to HCI4D in two ways: 1) spurring discussions about what user groups are marginalized in HCC research; 2) offering researcher a practical approach for uncovering western biases embedded in ICT design. As other researchers argue, the HCC communities' traditional ways of doing research may not be applicable in these new settings, thus opening the door for alternative approaches to research (Chetty & Grinter, 2007).

2.2 Background and Relevant Perspectives from other Disciplines: Congregational and Communication Studies

Though my research is situated within the HCI and related research community, perspectives from congregational and communication studies shaped my thinking about topics central to my dissertation. First, I present an overview of congregational studies and describe why churches are compelling sites to investigate technology use. My work

draws from congregational studies in terms of the methodology used. I also extend prior work in this area by deploying a technology probe in a church setting, a research approach that is unique to HCC and unheard of in congregation studies. In this section I present background information describing why I conducted formative studies observing megachurches and interviewing their leaders and members. Second, I demonstrate how my dissertation builds on prior work examining religion and ICT use from communication studies literature. Widespread use of the Internet to support religious practices motivates research in this field, but much of this scholarship is descriptive and not grounded in an empirical understanding of users' actual ICT practices. Finally, communication studies research investigating ICT and religion tends to focus virtual (rather than brick-and mortar) worship environments and how they change (or do not change) traditional Christian church worship. Brasher (2004) and I contend technologists' emphasis on developing virtual forms of worship is "unimaginative," and that there are more interesting ways ICT can be used in Protestant Christian worship environments.

2.2.1 Congregational Studies: An Introduction

The field of congregational studies is a relatively recent addition to the field of religious studies and is broadly defined as the "study of the culture in churches" (Ammerman & Farnsley, 1997; Carroll, Carl & McKinney, 1986). Thumma emphasizes that religious scholars have overlooked the value of an intense socio-historical study of congregations and this is unfortunate because churches are the heart of Protestant Christian religious life in the U.S. (Thumma, 1996). Congregations are the basic unit of religious life, they channel members' energies into more than the sum of their parts and have formed the bedrock of American religion (Ammerman, 2005). Further and relevant

to my dissertation, churches are useful organizations because they bring together large groups of people that look like each other and share characteristics such as class, education level and race. Sociologists call this "institutional isomorphism," which refers to "the constraining process that forces one unit in a population to resemble other units that face the same set of environmental conditions" (DiMaggio & Powell, 1983). In other words, some organizations are comprised of individuals who similar to one another. Churches are an example of institutional isomorphism because they tend to be segregated in terms of race, economic status, and ethnicity, in addition to denominational affiliation (Hadaway et al., 1984). Given, that a key question addressed in my dissertation is: "What characteristics affect ICT adoption (and rejection) among different congregations?" this makes churches ideal sites for me to study how ICT adoption differs among different groups.

Methodologically, researchers in congregational studies employ ethnographic research techniques to examine religious communities (Carroll et al., 1986; Kemper, 2006). Examples of this approach include Haight's study of African American youths' socialization processes in Sunday schools (Haight, 1998), Thumma's fieldwork at an Atlanta, GA, megachurch (Thumma, 1996) and Warner's investigation of the changing nature of Protestantism within a Presbyterian Church in Mendocino, CA (Warner, 1988). I draw from congregational studies in terms of the methodology used in my research. However, my research departs from prior work because I evaluate a technology intervention in two different congregations. This research approach enabled me to answer questions about ICT adoption and rejection that could not have been answered through interviews and observations alone.

2.2.2 Megachurches

Within congregational studies there is growing interest in megachurches because they are one of the "most significant recent developments on the religious landscape in the last thirty years" and are redefining worship practices for millions of Protestant Christians (and some Catholics) worldwide (Vaughan, 1993). In terms of my research, megachurches are relevant because they are aggressively adopting ICT in ways that are changing traditional Protestant Christian worship practices. This is not to say that believers of other faiths are not using technologies, only that evidence exists that the uptake has been particularly rapid and extensive among American Protestant Christians (Ellingson, 2010; Thumma, 1996). Megachurches are "lead users" in terms of ICT use and religion because they are creating practices smaller churches follow (Von Hippel, 1986). Thus investigating their members and leaders provided me with the most opportunities to understand issues surrounding ICT use and religion. In the rest of this section I provide background information about megachurches and the people who attend them.

Megachurches are defined as growth-oriented churches with a sustained average worship attendance of more than 2,000 (Thumma, 1996).[4] Other characteristics common among megachurches include: they lack a strong denominational affiliation, unlike more traditional churches; they provide multiple activities outside of Sunday worship including

[4] It is worth noting that nothing significant happens when a church's membership grows from 1,999 to 2,000. Indeed, churches with 1,000 are considered megachurches, because they have a similar theological stance or attract similar demographics as ones with more members. Finally, determining precise church membership numbers is difficult. For various reasons, such as someone may be a member of a church but not regularly attend services and vice versa (Hadaway, C.K., Marler, P.L., & Chaves, M. (1993). What the polls don't show: A closer look at U.S. church attendance. *American Sociological Review 58*, 741-753.

Bible studies, recreational sports, and mission trips; their growth can be attributed to a gifted spiritual leader (Thumma, 1996).

Megachurch attendees tend to be theologically conservative, meaning they affirm the authority in the Bible and the need for personal faith in Jesus Christ to be saved. Demographically megachurch members are largely U.S.-born, college educated, young (aged 35 or less), middle class and married with children. This largely mimics the makeup of the suburban areas where megachurches are located. Thus, it is not surprising that megachurches are disproportionately located in the American "Sun Belt," a region that stretches across the South and Southwest parts of the U.S. and home to many of the countries' largest suburban areas (e.g., San Diego, CA; Dallas, TX; Raleigh, NC; and Atlanta, GA). Georgia has the fourth highest number of megachurches, only behind California, Texas, and Florida, making Atlanta an excellent place to conduct fieldwork. Though there is no data to support this claim, one would imagine that given their age, geographic location and economic status, megachurch members are likely to have to own and have access to a wide range of ICT. Megachurches account for less that 1% of churches in the U.S.; however, statistics suggest that approximately 300 U.S. megachurches are home to almost 20% of the country's total churchgoers. Others statistics indicate there are currently 1200 megachurches in the U.S. and Canada and suggest this number will grow in the next decade (Chaves, 2006). In the formative studies presented in Chapter 4, I present my formative studies with megachurch members and leaders. I chose to study these users because in many ways they represent the "leading edge" of using ICT for religious purposes.

2.2.3 Studying ICT use in Megachurches

Within the relatively new field of congregational studies is some scholarship examining how churches use ICT. Interestingly, this research suggests congregations use technology differently than some secular organizations because the introduction of new technology into worship settings often accompanies concerns about its appropriateness. This debate has existed within churches since the turn-of-century and motivated questions in my formative studies about why these concerns exist. In this section, I present a history of ICT use in churches, focusing on the continued tension resulting from the introduction of new technology into these sacred settings.

A Brief History: Crowley provides an overview of the history of media use in American churches (Crowley, 2007). She demonstrates how churches' adoption of technology mirrors larger technological changes in the U.S. Among the earliest accounts of media use in church include showing stereopticon slides and silent movie reels with religious themes during worship during the early 1900's. As movie projectors became more widespread, churches used them in lectures, religious education and evangelization. Though use of this technology was not ubiquitous, churches that did use projection during services recognized the medium's ability to draw large numbers of people into worship services. In the 1950's Protestant preachers user overhead projectors to "literally magnify their sermon points for their listeners" and to project words to hymns (Crowley, 2007). During the 1970's television equipment made its ways into some services. For example televangelist Jimmy Swaggart was among the first to incorporate television graphics, slides and film clips to support his sermon (Hadden & Shupe, 1987). Now that technology has become cheaper and widely used for presentation purposes, Swaggart's

early use of graphics to complement his sermons is now widespread, particularly in megachurches.

Coinciding with churches' adoption of new projection technologies were concerns about whether or not it is appropriate to integrate these devices into worship services. Churches largely discontinued using moving pictures in their services following the debate about morality and the cinema taking place in the U.S. between 1921 and 1923. These debates lead to a set of industry censorship guidelines known as the Hays Code (Lindvall, 2004). These guidelines censored movie content that promoted promiscuity, gambling, alcohol use and created a stigma surrounding movies that prompted churches to avoid showing them in their sanctuaries.

Decades later, anxiety about using technology to present secular content in churches persists. Rather than focusing on morality and movies, today this tension stems from concerns that new media turns worship into entertainment. It is common to see clips from secular movies and popular music videos in worship services today and some ministers are encouraged to integrate secular content into worship. For example, a popular book aimed at helping ministers attract new members to their church suggests "it might actually be helpful for you to watch MTV from time to time to study the culture and learn how to more effectively reach people for Jesus" (Stevens & Morgan, 2005). Yet, some religious scholars argue showing MTV videos at church synonymizes worship with entertainment and this "dilutes the gospel" that is the "the real substance of Christian faith" (Schultze, 2002; Schultze & Woods, 2008). Other apprehensions arise from the use of PowerPoint in church worship. Building on Tufte's critique of the popular presentation software, Murphy argues that PowerPoint trivializes content,

decreases interaction between church members, and interferes with the pastor's preaching (Murphy, 2006; Tufte, 2003). This work is largely descriptive, but provides an excellent foundation for understanding issues surrounding ICT and church worship that I extend in this dissertation.

Overview of Churches and ICT use Today: As I previously mentioned, widespread use of ICT in megachurches has prompted smaller churches to integrate technology into their services. Practices that emerged from megachurch worship services include projecting song lyrics onto screens located in churches' sanctuaries, using multimedia in worship services (e.g., videos and projected imagery), and singing contemporary Christian rock music. One of the largest and oldest megachurches in the U.S., Willow Creek Community Church, is credited with creating the multimedia experience commonly seen in Protestant Christian churches today (Leucke, 1997).

Willow Creek established a trend that has not only altered traditional forms of worship, but prompted religious organizations to devote significant financial resources to purchasing ICT. Reports from the audiovisual industry assert that 75% of North American churches purchased or are planning to purchase technology systems. Systems typically cost $10,000 and consist of a screen, a projector, a computer, and a videocassette and/or DVD player (Wilson & Moore, 2002). To help churches manage and create this content various software packages (e.g., Prologue Sunday Plus, SongShow Plus, and Media Shout) and websites (e.g., SermonCentral.com and Oxygen Church Media) exist. Moreover, these changes have led to the creation of new positions such as media directors, IT specialist, and webmasters within churches (Thumma, 2001). There

are numerous magazines that provide church media directors with news on the latest technologies and useful advice on how to appropriately use them during worship (e.g., *Media Ministries Magazine*, *Christian Computing Magazine* and *Technologies for Worship Magazine*), countless "how to" books on the topic and yearly conventions for people interested in learning more about the topic.

In some churches, technology has replaced the need for the pastor's physical presence in services. There is a recent trend towards "satellite churches," or franchises, affiliated with central churches that are led by a single minister. The minister typically preaches at his (and it is almost always a he) church's main campus while his sermon is digitally broadcast to another church sometimes hundreds of miles away. Satellite churches have a life size high-definition screen behind the pulpit that stream the pastor's image from the main campus during the time of the sermon. Other aspects of the services are independent. For example, they have a physically present live band and staff to lead parts of the service where the minister is not preaching (Robberson, 2007). Atlanta, GA, is home to a church at the leading edge of this trend. North Point Community Church has a central campus and three satellite churches around the metro-Atlanta-area (see North Point Community Church's website: http://www.northpoint.org/).

Although ICT enhanced worship services are increasingly common, there are plenty of churches not interested in adopting this new form of worship. For example, some smaller churches have resisted creating multimedia worship experiences; however they do not ignore the trend of incorporating ICT into their services as evidenced by the emergence "contemporary services." These services resemble services at megachurches

in terms of their use of ICT and typically occur before or after a church's traditional, or ICT free service.

While other researchers, the most notable being Dr. Scott Thumma, focus on understanding the megachurch phenomenon as it appears in contemporary U.S. society, less attention has been given to megachurches' use of ICT inside and outside of worship services. Understanding how Protestant Christian megachurches and their members use technology is useful, because it can help these organizations design online resources that support their members' spiritual practices outside of Sunday services and point to future technological innovations grounded in their needs.

Empirical Work examining ICT use and Church Worship: Popular press articles about the use of projection systems in church abound, but empirical work investigating this topic is lacking. Shultze and Crowley are among the few scholars who empirically studied ICT use in church worship services. This research describes concerns brought about the growing presence of digital media in worship services. For example, Schultze (2002; 2004) writes that media worship distances members from the pastor's sermons. Specifically, he argues that "uncritically embracing information technology can lead to moral and spiritual poverty during church worship." Put another way, he is concerned that focusing on media during worship may interfere with worshippers focusing on God during worship. Based on his observations in churches, he developed guidelines suggesting appropriate ways to use media during worship services. For example, Schultze encourages pastors to use media in moderation to illustrate key points rather than relying on it throughout services.

Crowley (2007) carefully examines the "positive possibilities" and "perils of using media during worship services." Positive aspects of using media in worship include enhancing communication and creating greater liturgical access for deaf worshipers. Perils include worshippers taking on a passive role in services, as if they are viewing a PowerPoint presentation at work, or watching a movie in a cinema. Crowley argues this passiveness contradicts an important aspect of church worship—participation—and asks if there are ways technology can increase this in worship services. She proposes "communal co-creation of worship media" to remedy some of the concerns posed by new media in worship, but does not implement a technological system to support member created content in church. Schultze and Crowley suggest their findings are based on empirical observations but the researchers do not present the details about their research such as how many churches were observed and how they analyzed their data.

Finally, Schultze is affiliated with a theologically conservative academic institution and Crowley teaches at a seminary in Chicago. In many ways they are *insiders*, or have a strong hand in shaping discourse about technology use in churches and communicating their knowledge to groups and individuals working in similar contexts they do. In contrast I am an *outsider*, because I am not trained as a theologian and am affiliated with a research institution with no formal ties to religion. Arguably, my background and affiliation grant me a degree of methodological distance lacking in prior empirical work examining churches and technology.

2.3 Communication Studies and Online Religion

Now I turn my attention away from prior work examining ICT in religious settings and focus on religious individuals and organizations use the Internet. This is

perhaps the most widely known research examining technology and religion. Studies in this genre typically focus on religious practices in online community settings and virtual forms of worship. Broadly, this research treats online religious spaces (e.g., social networking sites and virtual churches) as separate from physical worship settings. In contrast, my research contributes knowledge about how ICT can bridge the gap between individuals' online and offline religious experiences. In the rest of this section, I provide an overview of empirical research investigating online religious communities and another prominent research topic within this category—virtual churches.

2.3.1 Online Religion

The rapid adoption of the Internet in the 1990's gave rise to a significant body of scholarly research focused on understanding religious practices online (Campbell, 2005a; b; Dawson, 2004; Sturgill, 2004). For example, research describes how different religious individuals use email for community coordination (Wyche, 2006a), and search online for religious materials such as online sermons and gospel music (Helland, 2007; Larsen, 2004). These studies also show that while the Internet can allow adherents of less practiced religions to find critical mass (e.g., Wicca), simultaneously it can raise questions about control of doctrine and interaction for faiths with many practitioners (Campbell, 2005c). Another common finding within this body of work is that of leveling—that the organizational hierarchy is flattened online raising questions about control (Kong, 2001). However, this leveling effect is not always desirable, particularly when it comes into direct conflict with practices that turn on a hierarchy of authority in order to have meaning (Dawson, 2004). Finally, consistent among this research is an understanding that studying religious uses of technology provides knowledge about the

ways ICT use is marked by spiritual motivation and religious language rather than solely being driven by practical purposes (Campbell, 2005b; Højsgaard, 2005; Hoover et al., 2004; Howard, Rainie & Jones, 2000). This final finding motivates a key question addressed in my formative studies. Specifically, I use interviews and observations with megachurch members and leaders to uncover how spiritual motivations and religious language shape ICT use in ways these prior studies do not describe.

Campbell (2004; 2005a; 2005b; 2007) devotes significant attention to studying how religious groups use the Internet for spiritual purposes. Within her notable and extensive work examining this topic, she identified four reasons religious individuals and groups use the Internet (primarily Christians living in the U.S.) or processes she calls "spiritualising the Internet" (Campbell, 2005c). First, religious individuals understand that the Internet is a spiritual medium that facilitates religious experiences. Religious individuals understand online spiritual worlds are an extension of their offline spiritual worlds, thus they readily use the Internet to support their existing religious practices and to explore new ones. Second, and related to the first process, the Internet is a sacramental space suitable for religious uses. Campbell suggests religious uses of ICT are set apart from secular ones, or are "made sacred." Thus, technology designers should understand and acknowledge that religious uses of technology are distinctive from secular uses. She compares online worship settings to European Gothic cathedrals and recommends that like these structures, online worship environments need a "distinctive design" to distinguish them from secular online places. Third, the Internet is a tool that promotes religion and religious practices. Specifically, like the radio and television before it, ICT supports proselytizing, preaching, sending and receiving prayers. Finally, religious

individuals and groups adopt ICT to affirm their religious beliefs. Campbell's research provides an initial framework for understanding religious uses of ICT. My research extends Campbell's work by using a technological intervention to understand religious uses of ICT in real-world settings and by presenting empirical findings based on individuals' actual ICT experiences.

Finally, Campbell investigates why religious organizations adopt ICT, but provides little knowledge about whether or not religious websites meet their users' expectations. The scant empirical work studying this suggests they may not. For example, Sturgill's (2004) content analysis of more than 300 Southern Baptist Churches' websites found few opportunities exist for church members to create and share personal content with members of their church. She speculated this was due to churches relying on their websites to attract new members, instead of meeting the needs of existing ones. Sturgill concludes by saying churches should use the Internet to provide their members with more opportunities to build online communities.

2.3.2 Virtual Churches

Research examining virtual churches is motivated by accounts suggesting an increasing number of religious individuals will go online to satisfy their religious needs. An estimated 25 million American adults use the Internet for religious or spiritual experiences (Hoover et al., 2004). By 2010, approximately 10% to 20% of the U.S. population will use the Internet as a primary or exclusive source of religious input (Howard et al., 2000). This estimate increases within teenage segments in which one in every six teenager anticipates substituting the Internet for brick-and-mortar church experiences within the next five years (The Barna Group, 2006). Religious individuals

are pursuing religious activities online including emailing prayer requests, downloading religious music, and seeking information about their faith (Larsen, 2004).

Some religious organizations try to make online environments more interactive by developing "virtual churches" or "cyber churches." Virtual forms of worship are viewed as a popular alternative to worshipping in brick-and-mortar churches for two reasons. First, an advantage of these environments is that people can be anonymous and this helps to create a more open worship environment because people can ask questions, share the gospel, debate issues, meet to pray together or just listen to worship music and sermons without the confrontational aspects of some ministries. Second, they are accessible to religious individuals who are unable to attend church for reasons such as old-age or disability (Ostrowski, 2006). Brenda Brasher (2001) estimates there are at least one million examples of these communities and they vary from online chat rooms to elaborate three-dimensional worship environments. Examples include the "First Church of Cyber Space," the "Church of Fools," and "Godweb.org," or the First Church of Cyberspace's webpage that began in 1994 (Ostrowski, 2006). The web site offers weekly sermons, access to a multimedia Bible, a chat room and a virtual sanctuary where users' avatars can worship. Similar online Christian churches exist in "Second Life"—an Internet based virtual world where users transfer real-life activities, religious symbols and performances into the virtual space. These online worship environments try to replicate traditional Protestant worship settings and have pews, a podium for the pastor, and meet on Sunday mornings. Worshippers have even developed unique emoticons for these settings. For example "\o/" indicates a user is raising his or her arms to praise and worship God (Radde-Antweiler, 2008). However virtual churches do not support "bodily presence"

and this is central to Christian beliefs (Miczek, 2008). In other words, believers can not physically come together and worship online.

Although online churches are criticized for lacking the physicality that is an integral part of Protestant Christian church worship, experts predict virtual forms of worship will grow in the future (The Barna Group, 1998). Such speculation motivates various studies comparing virtual forms of worship with traditional church worship. For example, Schroeder, Heather, and Lee were among the first to study users' experiences in an "E-Church" (Schroeder, Heather & Lee, 1998). These scholars explored how a small group of Christians replicated prayer meetings online. Despite missing key elements found in offline worship (e.g., a sense of emotional solidarity among congregants and body contact) the virtual church created new ways for individuals to express and share their faith. These ways included opportunities for Christians to worship with people from different parts of the world. Jacobs similarly examined how worship spaces are transformed when they move from a physical to a virtual environment (Jacobs, 2007). He evaluates this changes through a careful analysis of worship settings—both offline and online—in two faith traditions, Christianity and Hinduism. Jacobs draws from architecture literature that demonstrates physical worship spaces are distinguished by architectural signifiers. For example, a steeple typically signifies a building is a church. He found that virtual temples and churches were "highly conventional in their design" or closely resembled their offline counterparts. He further argued that they must be if they are to successfully encode meaning in the ways required and expected by their worshipers. However, Jacobs suggests there are opportunities to create online experiences

that engage users with their faith in alternative ways, a suggestion Brasher also makes (2001) and is explored in my dissertation.

2.4 Summary and Relevance to this Work

My dissertation draws from and extends research from HCC, Congregation and Communication Studies. Researchers from HCI and related research communities have created a rich body of research examining secular ICT use in everyday life. Recently HCI researchers have broadened their research interests to include the sacred or faith-oriented aspects of users' lives. To date this research tends to be exploratory and focused on a narrow set of users. I saw an opportunity to more deeply understand religion and HCC by asking questions the following question: What characteristics differentiate religious uses of technology from secular uses? I also draw from current HCI4D literature to motivate another key question addressed in my dissertation: What characteristics affect ICT adoption (and rejection) among church members at a Kenyan immigrant church? Specifically, examining Kenya immigrants broadens current HCI4D discourse by illuminating how ICT contributes to fluidity of cultural and transitional boundaries and illustrates how standpoint theory can benefit HCC. Further, my use of standpoint theory to guide my second deployment study illustrates how this approach can benefit ICT evaluation studies. Rather than using such studies to verify findings from formative research, evaluation studies have the potential to highlight values differences between those who develop and use ICT and those who use it.

I borrow from Congregation Studies in two ways. First, like researchers in this discipline I identified churches as compelling sites to understand religious life in the U.S. My dissertation complements prior work in this area because it examines technology use

and African immigrant churches—overlooked areas in congregation studies. Second, ethnographic approaches are widely used to study congregations because worship settings are complex and "messy" environments. I adopt an ethnographically informed approach in my dissertation.

Finally, I discuss related research from Communication Studies examining the Internet and religion. This work is largely descriptive and offers little guidance on how or if ICT should be designed differently to support religious practices, but was useful in helping me develop the interview protocols used in my formative studies. In this corpus of research I also uncovered various studies investigating virtual and online churches. Researchers are motivated by studies suggesting online worship will become more common in the future and are interested in how traditional religious practices change in online environments (The Barna Group, 2006). A shortcoming of this work is that it fails to investigate whether religious individuals are actually interested in worshipping online and whether or not church leaders believe online worship can substitute for worshiping in brick-and-mortar churches. I asked church members and leaders these questions and present evidence suggesting that virtual forms of worship may not become as widespread as prior studies suggest. Thus, my focus on users' actual experiences and how these can inform new ICT extends this research.

CHAPTER 3: METHODOLOGY AND METHODS

In this chapter I explain the methodology and methods used to examine the differences between secular and faith-oriented ICT use, to uncover characteristics affecting ICT adoption in different churches and my decision to deploy a technology intervention in a Kenyan immigrant church. My approach draws from methods used in anthropology, design and HCC. Appropriating methods and methodological approaches from other fields is accepted within HCC; however, the drawback of this way of doing research is that it arguably leads to a diluted version and understanding of established methodologies (Crabtree, Rodden, Tolmie & Button, 2009). Thus, the goal of this chapter is to demonstrate how my qualitative approach that is grounded in concepts related to design-based research, design ethnography, multi-sited fieldwork and standpoint theory was appropriate for my project.

Chapter Three is loosely organized to reflect the two stages of my research: (1) the formative studies and (2) deployment phases of my research. A qualitative approach guided both phases of my dissertation, particularly the initial formative studies presented in Chapter Four. The deployment studies in Chapters Five and Six are also qualitative, but in addition to conducting interviews and observations I also asked church members to interact with a technology probe (Hutchinson et al., 2003) to confirm (or not) findings uncovered in the formative studies. Thus a qualitative and design-based approach (Barab & Squire, 2004) guided my research after I completed the formative studies.

In this chapter, I also describe how standpoint theory guided my second deployment study at a Kenyan immigrant church. In the process of describing standpoint theory I also discuss Harding's notion of strong objectivity (Harding, 1991). I used standpoint theory

to guide my deployment studies aimed at answering questions about how different congregations use ICT. I deployed ChurchShare in a congregation comprised of people who more closely resemble users typically examined in HCI, then conducted a deployment with users who have traditionally been overlooked in HCI research—Kenyan immigrants. By comparing findings from both deployments I conclude that conducting ICT evaluation studies with marginalized user leads to more relevant and more objective findings than conducting such studies with ideal users. Finally, I describe my approach to data analysis and present a summary of my standpoint, or orientation to the topics investigated in my dissertation.

3.1 Overview: A Qualitative Approach

My methods of inquiry are qualitative, or the findings from my research are not arrived at by statistical procedures or other means of quantification (Strauss & Corbin, 1998). I chose a qualitative approach for several reasons. First, qualitative methods can be used to explore areas about which little is known (Lofland & Lofland, 1995). Recently religion has become a topic of interest in HCI; however, when I started my dissertation research five years ago the topic was understudied within the field. Second, religion is a topic intimately connected to individuals' personal feelings, thought processes and emotions, thus making it difficult to learn about through quantitative research methods. Although some researchers use positivistic approaches to understanding religion[5], they recognize that religion and spirituality are complicated concepts to operationalize because

[5] Dr. Kenneth I. Pargament is the most notable example of this type of research. He is professor of psychology at Bowling Green State University who empirically studies various relationships between religion, psychological well-being and stress. Pargament helped develop a questionnaire to measure individual's Religious Coping strategies or the "RCOPE" (Pargament, K.I., Koenig, H.G., & Perez, L.M. (2000). The many methods of religious coping: Development and initial validation of the RCOPE. *Journal of Clinical Psychology 56*, 519-543.

of the diversity of beliefs and differences in how religious individuals define their faith (Zinnbauer et al., 1997). Third, all of my research takes place in real world settings. I interview ministers in their offices, megachurch members in their homes and Kenyan immigrants in their church. This contrasts experimental research where the researcher tries to completely control the conditions of the study. Such studies typically take place in a lab setting. Finally, this approach to research reflects my epistemological stance that knowledge comes from understanding the processes through which humans co-create their relationships to their world. I am skeptical there can an "objective" truth that can be specified and consistently reproduced because I view knowledge as being situated, or intimately shaped by a researcher's personal frame of reference and the context under investigation. This stance is inline with feminists scholars' critiques of science and technology studies (Haraway, 1988).

For five years I engaged in participant observation of 112 Christian worship services, at dozens of different churches in three countries. I formally interviewed 57 church members as well as 24 church leaders. In addition, I had informal discussions with dozens of church members, church staff and theology students about technology and religion. As Strauss and Corbin (1998) note it is common for qualitative researchers to become "consumed" with their topic of study. I was not an exception to this and found myself watching televised church services late at night, perusing the software aisles at Christian bookstores and collecting articles from the popular media related to my research topic in order to inform my understanding of religion and ICT use.

3.2 Methodology

In this section I describe my methodology and simultaneously draw attention to assumptions underlying my formative research. Broadly, my process pairs multi-sited ethnography, design based-research and standpoint theory. In other words, I conducted a series of formative studies that informed the development of technology probe called ChurchShare. This intervention was evaluated in two different field sites and by asking users who have traditionally been excluded (or marginalized) from the knowledge production process in HCC—Kenyan immigrants—I learned about assumptions embedded in my technology intervention and deployment study.

In this section I also describe standpoint theory and how it supports strong objectivity. I elaborate on this approach more than others presented in this chapter because my use of standpoint theory to guide my second deployment study (see Chapter Six) is a key contribution of my dissertation.

3.2.1 Multi-Sited Ethnography

Since Malinowski conducted fieldwork in the Trobriand Islands nearly a century ago, ethnography has been considered a useful approach to holistically describe a social phenomenon in various fields including HCI. Ethnography is not a method or procedure; instead it is a methodological approach well-suited for exploring complex problems embedded in multiple systems, for identifying associated factors, and for describing unanticipated outcomes (Malinowski, 2002). Ethnographic research typically includes: fieldwork done in natural settings, developing a holistic understanding of the topic under study, generating rich descriptions of people, their environments and interactions, and explaining your biases towards understanding activities from the informants' perspectives

(Blomberg, Giacomi, Mosher & Swenton-Hall, 1993). Within HCI and related communities, ethnographic research has been used to generate knowledge about ICT adoption, to inform the design of new computing devices and is commonly used by designer researchers (Nardi, 1997; Zimmerman et al., 2007).

Multi-sited ethnography has recently emerged as a new focus for ethnographic study. Marcus argues this approach is a response to changes in the world the most notable change being globalization (Marcus, 1995). Ethnographers' traditional approach of focusing on a single site provides a limited understanding of topics, particularly now that world has become interconnected through travel, economic markets, and technology. Marcus encourages researchers to focus on this interconnectedness more than a particular setting because it allows anthropologists to examine the circulation of the cultural meanings, forms and identities across time and space. His multi sited approach asks researchers to define an object of study then follow it. I chose to follow technology and followed it in multiples churches in Atlanta, G.A., U.S., Nairobi, Kenya and São Paulo, Brazil (Wyche et al., 2008; Wyche et al., 2009b). Findings from my fieldwork conducted in Kenya and Brazil are not presented in this dissertation, but this work is important because it motivated me to evaluate ChurchShare in an immigrant church (see Chapter Six). In some senses the research presented in this dissertation is also multi-sited because I conducted observations at 24 different churches and "followed" ChurchShare in two different churches.

3.2.2 Design Ethnography

Like multi-sited ethnography, design ethnography (DE) differs from classical ethnographic research. DE is focused on understanding how social interactions contribute

to the design of new products, rather than developing a holistic understanding of a community under study (Salvador, Bell & Anderson, 1999). Thus it was suitable for my research because instead of holistically studying the complex issues surrounding religion, culture, immigration and globalization, I scoped my research on issues relevant to technology design or ones I thought would be relevant to developing a technology probe. Not only does this coincide with my interest in translating empirical research findings into new computing applications, but this approach was suitable for the limited time I had to conduct fieldwork. Traditional ethnographers tend to spend months, sometimes years conducting fieldwork, to gain access and build rapport with the individuals and communities they are studying. DE typically takes place over shorter periods of time. This difference in length of time spent in the field is attributed to the rapid product development cycles in HCI (Millen, 2000). Finally, unlike traditional ethnographers, design ethnographers may employ photo-elicitation tools or cultural probes to determine how participants' thoughts are relevant to design (Gaver et al., 1999). For example, in Chapter Five, I describe how I unsuccessfully used a data collection technique similar to Gaver's probes in my research.

This section provides an overview of an approach that guided the formative and deployments studies in my dissertation. In the following chapters I provide additional details about these studies, including information about study participants and how my findings informed a technology intervention called ChurchShare.

3.2.3 Design-Based Research

Design ethnography provides some guidance on how to translate empirical findings into design guidelines and implications but little insights on how to deploy and

evaluate design ideas. Thus, design based research (DBR) guided the deployment studies presented in Chapters Five and Six, because I wanted to deploy a technology intervention to further investigate, support or repute findings from my formative studies. Brown originally conceived of design experiments as a methodological approach that attempts to examine learning in "messy", naturalistic contexts, while simultaneously producing evidence-based theoretical claims about learning in those environments (Brown, 2003). Although, design experiments typically take place in educational settings DBR provides an effective framework for my research because churches like classrooms are unpredictable environments.

In this approach, the computational artifact, or "technology probe" is designed to embody the proposed theoretical hypotheses and the subsequent deployment studies are used to either support or reject the original claims. The idea is an extension of Gaver's work with cultural probes—maps, postcards and others materials "designed to provoke inspirational responses from elderly people in diverse communities" (Gaver et al., 2001). Hutchinson (2003) and her colleagues built on this idea by using technologies rather than physical objects to gain an understanding of communication needs in real world settings. They define technology probes as simple, flexible, adaptable technologies with three interdisciplinary goals: the social science goal of understanding the needs and desires of users in a real-world setting, the engineering goal of field-testing the technology, and the design goal of inspiring users and researchers to think about new technologies (Hutchinson et al., 2003). In my dissertation, I developed a technology probe named ChurchShare based on findings from a series of formative studies. Then I deployed the artifact to evaluate claims made about the technology intervention. In all, I conducted two

iterations of design and fieldwork. I refined my design intervention and study design when necessary to accommodate the context where ChurchShare was deployed. Such revisions are key tenants of a DBR approach.

This research approach provides an alternative to hypothesis-driven research and is useful for evaluating an intervention in a "messy" context where isolating a single variable would be difficult. My research is driven by a desire to understand contexts that have been overlooked within human-centered computing disciplines such as religious settings. DBR provides an accepted and useful methodological toolkit for researchers interested in studying technology interventions outside office setting and various "real world" contexts (Barab & Squire, 2004). Finally my research is a departure from traditional DBR studies because I used standpoint theory to guide my second deployment.

3.2.4 Standpoint Theory and Technology Probes

Building on prominent feminist scholars' work, Nancy Hartsock introduced standpoint theory in 1983 (Hartsock, 1983). Broadly, she draws from Marxian theory to illustrate how the sexual division of labor structure men's and women's lives differently. For example, women are traditionally responsible for giving birth and childrearing. Women are often expected to care for the elderly in their families and maintain homes. In addition to domestic environments, women also tend to be responsible for maintaining the spaces where men work, for example, secretarial work. Yet this work is often undervalued and treated as inessential when compared to traditional male forms of labor. Thus, a feminist standpoint is essential for examining systematic oppression in societies that devalue women's work and, in turn, their knowledge.

Harding notably extends Hartsock's ideas by examining how feminist standpoint theory shapes scientific research and suggests that like labor, standpoints significantly affect the production of knowledge (Harding, 1986, 1990; 1991). Specifically, dominant standpoints affect what methods are used, questions asked and what contributions are valued in scientific communities. Though scholars disagree about the precise definition of standpoint, I use a definition most relevant to my dissertation and that draws from Harding's work. A standpoint is more than a point-of-view or one's perspective, it also includes what an individual (or group) chooses to focus on and obscure.

In my dissertation I assert that Kenyan immigrants are understudied in HCC research, or that they are a group who has been marginalized in HCC research. According to Harding (1993), the perspective from the lives of the less powerful, or marginal, can provide a more objective view than perspectives from the lives of the more powerful. This notion comes out of the Marxist notion that, while the master only knows his own life, the slave knows both his life and the life of the master (Hartsock, 1983). Marginal lives are lives that are able to grasp not only the concepts that rule the lives of the ruling class, but that also stand outside those concepts and so are able to recognize them as conventions or the status quo. Thus, a standpoint theory approach attempts to draw from experiences that can only come from the perspectives of the marginalized, or as Harding (1991) writes those who have not been at the traditional targets of knowledge production. In this dissertation I contend evaluating technology probes with marginalized users can benefit HCC, by highlighting assumptions embedded in ICT design.

To be clear, Harding does not suggest that the lack of a feminist standpoint in science leads to bad science or poor research methods, but she more broadly argues that

overlooking women (and other marginalized groups) in research creates a system that supports western, white, elite class males. She adds that members of this privileged group fail to reflect on their positions and how it shapes what is valued (and devalued) in scientific communities (Harding, 1991). It is this lack of reflection among privileged groups that hinders science.

To summarize, there are three key aspects of standpoint theory that inform my research. First, the social position of the researcher is significant because it affects what knowledge is produced. Second, more objective knowledge is not a product of observation or a disinterested perspective on the world (as Straus and Corbin (1998) define objectify), but is achieved by struggling to understand one's experience through a critical stance on the social order within the knowledge production process. Finally, standpoint theory supports "strong objectivity" or the notion that the perspectives of the disadvantaged individuals can be of help in the creation of more subjective accounts of the world (Harding, 1991; 1993).

Using Standpoint Theory to Guide Research: Examples of using standpoint theory to guide research abound in Science and Technology Studies (Haraway, 1978; Hubbard, 1990; Keller, 1983) but are rare in HCC work. Thus, to further conceptualize this approach and illustrate how it is used in my dissertation I present a case study demonstrating how standpoint theory can shape decisions about participant recruitment in empirical studies. Specifically, this medical case study illustrates how including participants who have largely been excluded from research can highlight shortcomings in prior scholarship.

Rosser (2008) examines cardiovascular disease research to illustrate how excluding women from research led defining heart disease as health problem that affects white middle-class, middle-aged men. As more women entered medicine and science fields they started conducting research on women's health. They found that prior research in this area was largely limited to studying reproductive health and gynecology and researchers overlooked other diseases. Thus knowledge about diseases that affected men and woman equally was based on an understanding of men's health. Although men and women both experience heart disease, it tends to strike women later in life compared to men. An increased presence of women in studies examining cardiovascular disease led to this discovery. Further, female scientists found that excessive focus on male research participants and defining heart disease as "male" led to under diagnosis of the disease in women because medical practitioners did not look for the disease among women as they grew older (Rosser, 2008). Of course biases in research are not limited to women, but other groups who have been underrepresented such as African-Americans.

This brief example illustrates how there is a tendency for researchers (in some scientific disciplines) to study participants who resemble them. Akrich (1995) coined the term I-methodology to extend this idea to technology development. White, upper middle class men dominated medical research for decades; in turn this led to an understanding of diseases largely based on studies of white, upper middle class men. Tech-savvy, Western born researchers dominate HCI research, are largely the target of HCI research and deployment studies. Similar to how conducting medical studies of women led to a broader understanding of heart disease, I suggest that conducting deployment studies with

African immigrants can lead to a broader understanding of how religion shapes ICT use and rejection.

3.2.5 Using Standpoint Theory to Support "Strong Objectivity"

In this section I discuss strong objectivity and in the process highlight other significant features of standpoint theory. Strong objectivity suggests that researchers put themselves on the same "critical, causal plane as the objects of knowledge" (Chodorow, 1978,1999). Harding adds that theorizing from the perspectives of marginalized persons and groups can be a useful way for researchers to put themselves on the same plane as those under study. In other words to achieve strong objectivity, researchers should imagine what a project—its questions, methods and results—might look like to someone who is not a beneficiary of such research or does not share many of the same cultural assumptions as the majority of the researchers engaged in such research endeavors.

During my initial deployment study I learned that individuals who participated in my study broadly represented the type of users who typically participate in HCI deployment studies. For example, they were white, middle class, college educated, English speaking, American born and regularly used email, mobile phones, social networking sites and other ICT in their daily lives. In many ways these individuals were like me and according to Harding, because of these similarities the findings from this deployment represent "weak objectivity." Thus, to generate more objective findings in my second deployment I deployed ChurchShare with a marginalized group who differed from me in terms of where they were born, the languages they speak and most importantly their attitudes towards ICT—Kenyan immigrants.

Background: The roots of strong objectivity can be traced to standpoint theory and to questions about the exclusion of women from policy debates and their lack of presence in most scientific disciplines (Harding, 1986, 1990). Thirty years ago Harding asked questions such as: "What underlying assumptions and processes led to the noticeable underrepresentation of women scientists and engineers in scientific and technological institutions?; What underlying assumptions and processes had led to the noticeable underrepresentation of women scientists and engineers; and What was responsible for their even lower numbers at higher levels in scientific and technological institutions?" Since then women's presence has increased in scientific and medical fields and Harding argues these advances led to more legitimate scientific outcome.

Strong Objectivity, Standpoint Theory and HCC: Though Harding's critique has yet to be applied to HCI evaluation studies, her concerns about the assumptions embedded in HCI research and ICT development echo other researchers' critiques of the field. These include Bell, Blythe and Sengers' work on "defamiliarization"—the act of making the familiar strange—as a methodological intervention that allows one to explore implicit assumptions about domestic design (Bell, 2005). Other examples include Bell and Dourish's (2006) argument that the Ubiquitous Computing visions' of the future is a "very American one" and Bardzell's recent work contending feminism can provide the HCI field with alternative measures to consider when evaluating ICT (Bardzell, 2010). Specifically, Bardzell cites Harding and suggests evaluating ICT with users who have traditionally been excluded from technology deployment studies can highlight

assumptions embedded in research design, the questions asked, and validity of the outcomes.

My stance begs the following question, "Who has been excluded from knowledge production in HCI?" Admittedly, this is a complex question and adequately answering it is outside the scope of *this* dissertation. However, for the purposes of my research I contend that African immigrants living in the U.S. are excluded from formative and evaluation studies in HCI, CSCW, and UbiComp.[6] To address this imbalance, I deployed ChurchShare at a Kenyan immigrant church and found uncovered biases and assumptions embedded in my research design and technology intervention.

3.3 Methods: Data Collection and Analysis

In the prior sections, I described the methodological approaches that guided my work. In this section, I describe the methods used in my dissertation work to collect and analyze data. Detailed information about the data I collected from each of the individual students appears throughout this document, but here I present my reasons for selecting my methods and approach to analysis.

Findings presented in this dissertation are primarily based on interview data and observations recorded in my fieldnotes. Other methods such as photo and artifact analysis also provided me with supporting data that helped me understand and interpret my observations and interviewees' statements. In the rest of this section I present a table

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[6] A search of the ACM Library indicates there is one published study conducted with African immigrants in the U.S. Best, M., Smyth, T., Serrano-Baquero, D., and Etherton, J. (2009). "Designing for and with diaspora: a case study of work for the truth and reconciliation commission of Liberia. In *Extended Abstracts of the ACM SIGCHI International Conference on Human factors in Computing Systems (CHI '09)*, pgs. 2903-2918.

detailing when and where my fieldwork took place and an overview of why I chose to use interviews and observations throughout my research.

3.3.1 Chronology of Data Collection

This dissertation is comprised of data collected from five field studies. DE guided studies one through three; these formative studies motivated the development of ChurchShare. DBR shaped studies four-five and involved asking church members to interact with my technology probe for a three-month and four-month period respectively.

Table 2: Chronology of Data Collection

			Details	Collaborators	Publications
1.	Summer 2005-Fall 2006	American Christian ministers' uses of ICT study.	Conducted 13 interviews with leaders of Protestant Christian ministers to understand how ICT supported their spiritual practices	Gillian Hayes, Lonnie Harvel, and Rebecca Grinter	(Wyche, S.P., Hayes, G. R., Harvel, L.D., and Grinter, R.E., CSCW 2006)
2.	Fall 2006-Summer 2007	American Christian laity's uses of ICT study.	Conducted 20 interviews and in-home tours with Protestant Christian megachurch laity to understand how ICT supported their spiritual practices	Yevginiy Medynskiy and Rebecca Grinter	(Wyche, S.P. and Grinter, R.E., CHI 2009)
3.	Summer 2005-Spring 2010	Megachurch observations	Conducted weekly observations at Atlanta-area megachurches.	Yevginiy Medynskiy	(Wyche, S.P., Medynskiy, E., and Grinter, R.E., *Ext. Abs.* CHI 2008)
4.	Fall 2008-Spring 2009	Field Study Iteration I deploying ChurchShare in American church	Three month long deployment study at non-immigrant church.		
5.	Summer 2009	Field Study Iteration II deploying ChurchShare in Kenyan immigrant church	Four month long deployment study at immigrant church.		

In addition to DBR, standpoint theory guided the final deployment presented in Chapter Six. The table on the previous page provides an overview of those studies.

3.3.2 Participant observation and fieldnotes

I believe knowing about a social space involves immersing oneself in the environment under study as a participant. In participating as fully as possible in another way of life, the ethnographer learns what is required to become a member of that world, to experience events and meanings in ways that approximate members' experiences (Emerson, Fretz & Shaw, 1995). Further, to begin to develop a different standpoint it is necessary to immerse oneself in an unfamiliar environment. Thus I chose to be in the world I was investigating which meant attending and observing Sunday worship services at churches comprised of various types of members.

The term "participant observation" does not fully account for what degree the researcher actively participated in the setting under study and whether or not the researcher is known by those being studied (Emerson, Fretz & Shaw, 2001). To be clear, my levels of participation and the degree church members knew I was a researcher depended on the type of church I was observing and whether or not members were asked to interact with ChurchShare. For example, during my initial megachurch observations at churches in the Atlanta area, I did not reveal to others that I was a researcher. Instead I worked to "blend in" as much as possible. I was careful to dress and behave in a manner that was appropriate for attending church services; this meant doing what ministers asked. It was common to be asked to greet an unfamiliar person at services. Sometimes this meant exchanging a handshake, in other services it meant exchanging hugs. At the Kenyan immigrant church it meant saying "bwana asifiwe" or the Swahili phrase for

"praise God." At all services I bowed my head in prayer when others did, sang hymns, and danced in my attempts to not draw too much attention to myself during services. In Chapter Six, I elaborate on the methodological challenges I encountered as a non-African female researcher studying a Kenyan immigrant church.

An advantage of my multi-sited approach was that it allowed me to reflect on my role as an observer in a way that would have been difficult to do if I had only attended white churches in the Atlanta area. Trying to "blend in" at services in Nairobi and at the Kenyan immigrant church in Atlanta was challenging because I was typically the only Caucasian person attending services. At predominately white churches in Atlanta, I could easily enter the sanctuary without drawing attention. The opposite was true in Kenya, where my appearance often meant being escorted to the front row of the sanctuary to sit and being asked by the minister to introduce myself. In churches where I deployed ChurchShare, I was a known researcher because to collect data church members needed to know why I attended services. Prior to all deployment studies, I met with the leader to get approval for my study and to schedule a Sunday where I could make an announcement about my research.

Like an anthropologist, my goal was to collect "thick descriptions" of these communities and how they used ICT to support their religious practices (Geertz, 1973). However, the human mind tends to forget much that has occurred and does so rather quickly. In order to overcome this I kept copious fieldnotes documenting my experiences and observations at the churches. I spent time taking fieldnotes detailing my thoughts and observations and filing the miscellaneous pamphlets and bulletins collected in the field. I

also regularly uploaded digital photos taken during my fieldwork so that I could easily access them in the future.

As Emerson et al. (1995), recommend in *Writing Ethnographic Field notes*, my notes began as rough jottings that were later turned into more refined notes and memos used during my analysis. During my fieldwork in Kenya my notes were distributed among my collaborators and the discussion they generated was useful in findings mutually agreed upon themes in the data. At certain times I was more diligent than others in taking field notes. For example, travel and paper deadlines made taking thorough field notes difficult.

3.3.3 Interviewing

In addition to the field notes generated during my observations, findings in my dissertation come from interviews conducted with church members and ministers. I conduct interviews because of my interest in other peoples' perspectives and belief that those I interview are the experts of the topics under investigation. Further, listening to people answer questions about their ICT practices inspires and motivates me to imagine new ways to use computing.

Prior to my formative studies, I developed an interview protocol based on reading literature and background materials (see Chapter Three). These protocols were tested during pilot studies to refine them prior to performing formal interviews. Conducting pilot studies also helped me become comfortable with asking participants personal questions about their faith and to determine appropriate questions to ask. Learning how to ask appropriately phrased questions was critical in developing sufficient rapport with the interviewees so they trusted me to respect their feelings about technology and spirituality.

During my formative studies, semi-structured interviews were conducted with church ministers in their offices and in churches where ChurchShare was deployed. Interviews took place in the church. I chose to interview participants in their homes in formative study #2 because my goal was to understand how ICT supported spiritual practices outside of worship services. For qualitative researchers, selecting an appropriate site to conduct interviews may seem to be a relatively simple research design issue. In fact, much thought often goes into where to conduct interviews (Seidman, 1991). Choosing an interview site is important and can aid in overcoming the "forgetfulness" participants may experience during interviews. In other words, by interviewing ministers in their offices and asking them specific questions about the technology they use (which was typically located in their office) I believed I would get a more authentic response to my questions. Similarly, by conducting interviews with participants at churches where ChurchShare was deployed I was able to ask them questions while viewing pictures in the sanctuary, thus avoiding them potentially forgetting about their thoughts following services.

3.3.4 Analysis: Grounded Theory

In this section I describe the methods used to analyze my data. Grounded theory techniques, particularly the constant comparative method and memo writing were inline with my reflective and critical approach to research. This approach is also compatible with my data collection methods because grounded theory assumes the researcher finds meaning in the data, or through the reflections and actions of the participants (Glaser & Strauss, 2009, 1967). Further, standpoint theory informed and influenced how I analyzed data collected during my deployment studies. Specifically, I looked for themes in the data

that illustrated how Kenyan immigrants' rejection of ChurchShare highlighted assumptions embedded in the application and more broadly ICT design.

Grounded Theory is an inductive approach to understanding phenomena. It is based on the premise that gaining a nuanced understanding of behavior, such as how religion shapes ICT use can only be achieved by rigorous observation and analysis. The method can be used for ethnographic analysis, where an ethnographer iteratively reflects on a data set, then observes and builds upon themes in the data until patterns and categories of analysis emerge (Strauss & Corbin, 1998).

Broadly, the theory building process consisted of two overlapping phases, coding and memo writing. Memos contained the products of my coding and allowed me to sort out ideas about the data in my head. Specifically, once my interviews were transcribed I initially read through them identifying, naming, and describing phenomenon found in the text. For example, in formative study #2 I categorized the different ways participants used ICT to support their faith at home during my initial analysis. Further analysis revealed how participants' faith-related interactions with email and other forms of ICT differed from secular interactions (Wyche & Grinter, 2009). Codes informed memos and vice versa.

Throughout the data analysis process, I relied on memo writing or creating written records that contained the products of analysis. Strauss and Corbin (1998) suggest that memo writing can take many forms and that researchers typically develop their own style. Given my interest in pairing my design skills with qualitative research I would often pair my written memo with an image to create an "insight card" (see Figure 2). Each card was given a title, a number and marked with the data on which it was written. I

created 186 of these postcard sized cards during my dissertation. More importantly, these cards document my thought process throughout my dissertation and provide links to the findings presented in my dissertation.

The process of creating these memos enabled me to organize my thoughts, keep my findings grounded in my data and forced me to make connections between my observations, interviews and themes in HCI research. Each card typically had excerpts from interviews, summaries of articles related to my research or conceptual thoughts about observations made at churches on them.

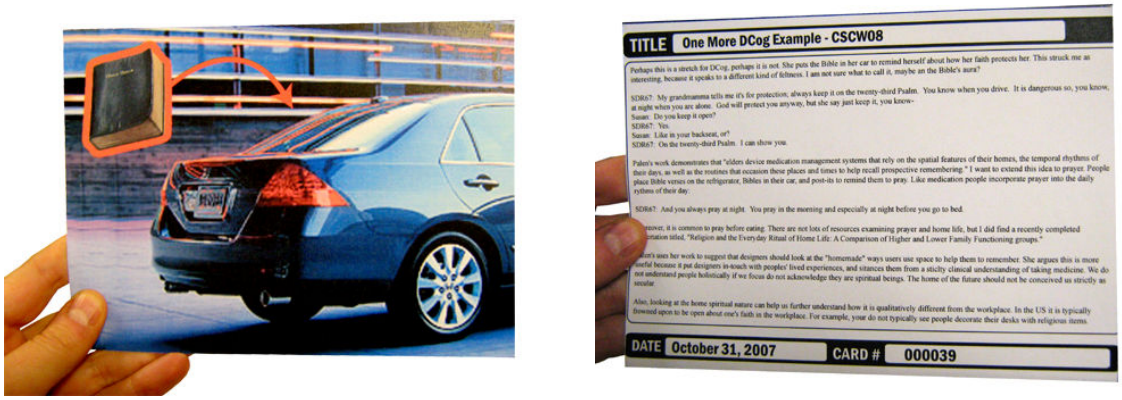

Figure 2: Insight Card Example (front and back)

3.3.5 Validity

Validity has long been a key issue in debates over the legitimacy of qualitative research. To increase the validity in my research, I used the following techniques to increase my confidence about the findings reported in this dissertation. First, once I published results from formative studies #1 and #2 copies of the papers were electronically mailed to participants. No participants told me I misrepresented their thoughts in the papers. Second, throughout my dissertation I engaged in informal conversations with religious scholars affiliated with Emory University's Candler School

of Theology and Columbia Seminary in Decatur, GA. Talking with individuals more knowledgeable about religion than I am helped me refine my thinking about themes emerging in my data. Further, these individuals often directed me to literature relevant to my research. By referring to literature and discussing my findings with scholars and key informants I was able to check and correct some misperceptions or mistaken inferences in my empirical data. Similarly, I collaborated with research subjects in my deployments studies. Specifically, in both deployment studies I interviewed the ministers of the churches where ChurchShare was deployed on several occasions. During our conversations I shared with them the pictures sent in and discussed why ChurchShare was used (or not used) in their congregations. Third, the data gained from conducting research in multiple settings acted as a corrective to the biases sometime associated with participant observation. Finally, in the prior chapter, I provide an overview of my standpoint. In the process of doing this I illustrate how my biases and personal experiences frame the findings presented in this dissertation.

3.4 Reflexive analysis of my standpoint

Given the qualitative nature of my research and that I am in some ways different from the people I studied, it is important to present a summary of my orientation to Christianity. Further, part of the philosophy behind standpoint theory is to be transparent about the experiences and "standpoint" of the researchers examining the phenomenon (Harding, 1991).

A key informant who I have talked to throughout my research referred to me as a "product of a mainline denomination church." She is correct. I was baptized in the Presbyterian Church and some of my earliest childhood memories involved attending

services in Marietta, Georgia. My family attended a Presbyterian Church after moving to Southwest Virginia in 1985 where I lived until moving to Pittsburgh, Pennsylvania to attend college. Botetourt County or more specifically, Blue Ridge, Virginia, is located approximately 20 miles west of Roanoke, Virginia, the tenth largest city in the state. Rural and theologically conservative appropriately describe where I grew up. Indeed, Jerry Falwell—the famous American Baptist televangelist and conservative commentator—lived in nearby Lynchburg where his university and ministry headquarters were located. Like my parents growing up and nearly all of my friends, I attended Sunday school and worship services regularly until I left home to attend college.

Though I was unaware of the theological differences between Presbyterians and other denominations until later in life, I knew that my families' orientation to religion differed from my friends who attended Baptist affiliated churches that were abundant in my county. Broadly, I felt we were more liberal than my friends who attended Baptist churches because we were less likely to "wear our religion on our sleeves" as my father would say. Further, my parents encouraged me to attend the college of my choice rather than one of the many religious affiliated schools near my hometown (e.g., Liberty University, Carson-Newman College and Campbell University).

Since moving away from Botetourt County, I would describe myself as an occasional Christian. I have attended various Presbyterian churches for the past 15 years and even served as a deacon at a Presbyterian church in Toledo, Ohio in 1999. Reflecting on these experiences I feel like they were motivated by a desire to meet new people and to be part of the community I was living in, rather than strong religious beliefs. Regardless, the experience and knowledge gained from attending services and growing

up in theologically conservative region in the U.S. allowed me to build rapport with participants throughout my research and taught me how to appropriately behave in worship services. For example, I knew how to dress when attending services and was familiar with many of the hymns sung during services I observed. Further, contacts from various churches I have been affiliated with introduced me to people in Nairobi, Kenya, who helped me find people to interview during study three and the final ChurchShare deployment was conducted at church my aunt and uncle have attended for more than 30 years. Given that I had a limited time to conduct my fieldwork, it was useful to know individuals who could help me find and gain access to participants quickly.

Though this research was important to me, I had few problems distinguishing between my role as a researcher and other parts of my self-identity. My resistance to identifying as a Christian helped me sustain this distinction. From the standpoint of a qualitative research methodology this taught me that "going native" was not something to fear over the course of my research. My relatively short time at the churches also helped me maintain that understanding for myself (and my participants) that I was a researcher. When participants asked I made it clear to them that I would no longer attend services once I had collected data relevant to my dissertation questions. Finally, my self-disclosure throughout this document will hopefully inform the reader of my personal and theoretical biases as they related to certain studies.

3.5 Summary

In my dissertation work I am concerned with understanding users and groups *actual* experiences using technology, translating that understanding into a technology intervention and pushing the HCI and related communities to reflect on assumptions

embedded in ICT design and evaluation studies. To do this, I devised an approach to research that draws from anthropology, design and feminist studies to accomplish my goals. Finally, although I do not discuss the limitations of my approach in this chapter I am aware of them and provide details about these shortcomings in following chapters.

CHAPTER 4: FORMATIVE STUDIES AND DEVELOPING CHURCHSHARE

In Chapter Two, I presented an overview of related work and argued despite recent interest in religion and ICT within HCC unanswered questions remain, such as: What are religious individuals and organizations' *actual* experiences with ICT? I present three formative studies in this chapter aimed at answering this question and in the process answer another question: What factors differentiate religious uses of ICT from secular uses? Unlike, the study presented in Chapter Six, standpoint theory did not guide these studies. Broadly, findings from my interviews with ministers, megachurch members and observations at churches highlight factors ICT developers should consider when building software applications for worship settings and point to more imaginative ways to design ICT for Protestant Christian services. Results from these formative studies are also reported in three external publications (Wyche, 2006a; Wyche & Grinter, 2009; Wyche et al., 2007). Following a discussion about my findings I describe how they informed the design and development of ChurchShare, a technology probe deployed in two different churches. I present this chapter as an example of design research, or knowledge that can inform the development of future commercial products (Zimmerman et al., 2007).

4.1 Formative Study #1: Church Ministers

In my initial attempt to uncover differences between how ICT support secular and religious practices, I interviewed church ministers. Ministers were chosen as subjects because they make the decisions about technology adoption in their organizations. They

also tend to have long term experience in churches, advanced degrees in theology and/or religious studies. I hoped this knowledge would allow me to answer my research questions and provide me with insights into the theological issues underpinning the growing presence of ICT in worship services. The goal of this study was to understand what factors differentiate ICT use in sacred settings from ICT use in secular settings. I present patterns that emerged during data analysis; specifically ones that illustrate how religious uses of ICT differed from what has been reported in prior HCC research.

4.1.1 Study and Participants

The study consisted of two data collection and analysis cycles. First, I conducted five pilot interviews with Protestant Christian ministers affiliated with the Georgia Institute of Technology. I did this to refine the interview protocol used in my formal interviews, to get a sense of how church leaders were using technology and to help me become familiar with the terminology used in churches. Second, I conducted 13 formal interviews with ministers from metro-Atlanta area churches. Interviews were transcribed and the constant comparative guided data analysis.

I used the World Wide Web to find participants. Specifically, I looked for church websites that included pastors' email addresses and contacted that individual or their administrative assistant. The initial email was followed up by a phone call or fax if the person contacted did not respond to my message after two weeks. I examined approximately 300 different churches' websites in the metro-Atlanta area and sent emails to 84 church leaders. Thirteen pastors agreed to be interviewed, 11 declined, and others failed to respond to my messages.

Participants came from Protestant Christian churches associated with the Southern Baptist Church, United Church of Christ, Episcopal Church, United Methodist Church, Evangelical Lutheran Church in America, and Presbyterian Church. Unlike the church discussed in Chapter Six, no churches in this formative study identified as "immigrant" but these ministers' churches varied along other dimensions. Of the thirteen churches, eleven had predominantly Caucasian members, while the other two had predominantly African-American parishioners. More than half of the minister's churches were located in suburban Atlanta (e.g., Marietta, Duluth and Gwinnett) and the remainder were located within Atlanta's city limits.

4.1.2 Findings: Characteristics that differentiate religious uses of ICT from secular uses

I present patterns that emerged during data analysis; specifically themes that illustrate how religious uses of ICT differed from what has been reported in prior HCC research. These characteristics include (1) mismatches between software capabilities and churches' needs (2) ministers' about being "reverent" and "relevant" (3) preserving communal worship and (4) increasing congregants' participation in worship services.

Mismatch between software capabilities and churches' needs: In this section I describe a common issue ministers expressed. Specifically, participants told me about mismatches between their needs, their congregations' needs and existing software and online applications. These differences prompted ministers to use software developed specifically for religious organizations and highlight opportunities to design online applications that better support churches' ICT needs.

During interviews, ministers consistently described their desire to communicate.

This type of communication was dominantly one-to-many, with the pastor leading a conversation with an audience in their church's sanctuaries. The most commonly discussed technology used in this mode was a slide generation system such as Microsoft PowerPoint. However this software did not always meet ministers and their churches' needs as this participant explains:

> There are special things about it because they recognize that in churches that we need to switch often quickly between a video, the sermon notes, possibly a video camera that is going on, Media Shout enables you to see and then click to process what goes onto the projector.

Although multimedia services are not impossible with PowerPoint, it was the degree of control and manipulation packages designed specifically for church worship services that appealed to ministers. The ability to project content on public displays while reserving a private screen for other types of manipulation and control is a central feature in religiously designed presentation systems. Another need prioritized in worship software is the ability to seamlessly transition between different types of media. Ministers consistently told me it was important that there were no disruptions during the service when they were making transitions between video clips and static images.

In addition to control there were other elements ministers needed in software used to support their worship services that might not be necessary in secular settings. For example popular worship-oriented software packages such as MediaShout and ProPresenter have song libraries that allow churches' worship directors to import hymns directly into their presentations. In addition to showing imagery another common use of screens and presentation software was to project song lyrics during services. These software packages have additional features unique to worship settings, such as "Nursery Alerts" or the ability to flash a message onto the screen during worship that notifies

parents they are needed in the church's nursery. Other prompts include "Please turn off your cell phone" that can easily be displayed on a churches' screen with the click of a button. Finally, this software makes it easy for worship directors to import Bible verses into their presentations.

There were other examples of software churches used that was not widely used among secular organizations. For example, ministers told me their organizations used specially designed software packages to monitor members' attendance and offerings. There are a variety of companies that develop software for churches such as "ChurchSoft," "Servant Keeper" and "WeGather.com." Like the presentation software, ministers appreciated that this software was designed specifically for religious organizations because it allowed them to monitor activities important to churches and less important to some secular organizations (e.g., members' tithing and attendance).

There were larger issues surrounding secular software that made it incompatible with churches, the most notable being cost.

> The cost, when we started we thought the cost was going to be at one place and it almost tripled from where we thought, because you have to have someone who monitors that every week. . . Cost is considerably more than we thought it would be and that makes it difficult for us to make all the updates we want and need to.

This minister was not only referring to high costs of software but also noted that purchasing software meant incurring other significant costs such as the salaries of the people who use it. Unlike for-profit organizations religious and other non-profit organizations often obtain funding from voluntary donations and fundraising. On one hand, this makes it difficult for these organizations to stay abreast of the latest technological innovations because they can not afford the latest upgrades and the latest

technologies. On the other hand, understanding how non-profits use ICT can point to novel computing applications designed for organizations with limited financial resources (Goecks, Voida & Mynatt, 2008). Findings from my initial deployment study indicate ChurchShare is an example of a novel ICT that supports fundraising in churches.

Finally, ministers expressed mixed feelings about whether or not existing online applications appropriately support counseling. Counseling members was a critical part of ministering and many participants used email to provide advice and guidance to members of their church who needed it. Ministers like using email to have conversations that would otherwise have been impossible, for example:

> A man that contacted us through our Website who said he was contemplating suicide and he wasn't a member of the church. You know my first thing was to ask him over email if he had a therapist and he said he did, but he didn't feel like it was helping any, and I said well would you like to meet with me and he didn't want to meet with me and he didn't want to give me his name, but we carried on a 3 or 4 month conversation over email.

More frequently, however, participants commented on the drawbacks of email for this particular function. Specifically, most pastors recognized the role of face-to-face communications for counseling, and tried to steer online situations into physical meetings. There are two ways this finding and others presented in this section are relevant to the technology probe presented later in this Chapter. First, these findings suggest there are opportunities to design computer software so that it better support religious organizations' needs. Second my results indicate it may be inappropriate to ask churches to appropriate software designed for secular settings.

"Relevance" and "Reverence": The second factor was less related to ministers' practical concerns of finding software that best suited their churches' needs but more to do with creating worship services that reflected their desire to "reach" tech-savvy members while simultaneously preserving traditional characteristics of church worship. One participant aptly described this as his "struggle," to remain "relevant" and "reverent." In the rest of this section I present factors that made it difficult for ministers to successfully balance these factors.

Ministers reported a demand among their congregations for technologically enhanced services. According to participants this demand was strongest among their churches; younger members who were accustomed to integrating ICT into every faces of their lives. Frequently, the pastors interpreted this desire for ICT enhanced services as a need to be "relevant." For example:

> I think that church 2005 can lose relevancy by expecting people to do things the way they did them in 1860, so if we are going to bridge the gap to reach 2005, then we have got to look at ways to be relevant, and so that is a big thing that we are always kicking around here, at the church, in my leaders meeting, in my staff meeting, 'is that relevant, how do we connect that to the community?

But this relevance also raised concerns for some ministers. For example, one participant noted:

> This is my struggle always, there is a fine line that I want to walk between being relevant and being reverent... what I mean by that is I think being relevant is embracing technology, and using it, but there is also the reverent side of the word of God.

This reoccurring theme interested me because in prior HCC research investigating homes and offices there were no references to a similar tension existing. In contrast, it

seems businesses adopted ICT to support their needs with little forethought about their implications and little desire to preserve traditional practices. Though ministers used other words to describe this tension, discussion about it consistently appeared in interviews. Upon further probing, I uncovered three reasons that shaped ministers' concern about relevance and reverence: (1) physical reprioritization (2) response to members' desires, and (3) concerns about decreased participation in services.

Physical Reprioritization: For churches designed to physically accommodate the technologies of contemporary worship the adoption and uptake of presentation, projection, audio-visual and lighting systems in service was relatively easy. However, for older churches accommodating ICT was less straightforward because their sanctuaries were not designed to support new forms of technology. In turn this meant making changes to their churches' traditional architecture so their buildings would be more "wired." For example:

> I had the foresight when we redesigned our narthex to have it wired for two televisions that could be directional or menu type operations that could tell you what is going on in the life of the church, or could even broadcast the service outside the into the narthex.

Those ministers who lacked the resources or "foresight" to design sanctuaries that accommodated ICT described making difficult decisions, such as putting the projection screen in front of the alter thus obscuring the cross, communion table or baptismal font. This is significant because the cross represents Jesus' death and communion is a symbol of the Lord's Supper, or the sharing of consecrated bread and wine that Jesus divided among his disciples. The baptismal font is another important symbol because it signifies the "community of those baptized into the death and resurrection of Jesus Christ" (White

& White, 1998). Prior research indicates these symbols create a comfort level for worshippers when they visit a new church (Mazumdar & Mazumdar, 2004), but more importantly obscuring them with a projection screen fundamentally changes a worship space by making it more closely resemble a secular rather than a sacred setting. Thus, a minister's decision to accommodate ICT in their sanctuaries broadly epitomizes the tension many participants felt about being relevant and reverent. On one hand ministers wanted to use projection screens to support their sermons; on the other hand, concealing religious symbols altered traditional (and significant) elements in their worship settings.

In addition to placing a projection screen in front of important symbols, there were other ways reprioritization manifested in sanctuaries, such as the disappearance of hymnals. Music continues to be an important part of church services but as ICT become more ubiquitous reading words from screens has replaced reading them from physical books. Ministers told me prioritizing projected words over written ones raised concerns among members of their congregations. For example:

> …instead of using hymnals the words are broadcast on the screen. That was a real source of tension for a few people for awhile; you know the purists wanted the hymnal.

In many instances "purists" were concerned because projecting hymns altered an age-old practice of physically holding, reading and singing from a hymnbook. Some ministers lamented that families in their congregation no longer collectively sang from a shared hymnal. Minister told me there was an "intimacy" to singing this way that no longer existed now that words are projected onto a screen. Further, the disappearance of hymnals creates a "hands-free" service that is "livelier" than traditional services, because rather that stoically standing and reading from a book, worshippers are now free to raise their hands and move in unison with the music. This change, in addition to the

contemporary music played in many of today's worship services creates a service style that differs from some more traditional forms of worship historically found in Protestant Christian churches.

Response to members' desires: Another way ministers worked to balance members' competing beliefs was to establish two worship services that took place on Sundays. One was a "traditional" service and the other was a called a "contemporary" service. The presence or absence of ICT was the key feature differentiating these services. When I asked ministers why they offered multiples services, most told me it was in response to their members' desires. As reflected in the prior section, some of the "purists" were adamant about having the option to attend a service without ICT. Thus it was common for eight of the 13 ministers interviewed to offer "traditional" and a "contemporary" worship services. For example:

> We have two different services, and yes we use PowerPoint in the contemporary service and we have music on the screen, we use digitals and cameras and the whole business, and then in the traditional service we use microphones.

And

> In terms of computers and graphics, visuals, that sort of thing, you won't find any of that in our traditional service, but in our contemporary service we have screens, words for the songs are projected on the screen during the ceremonies, there are visuals that are projected that illustrate or support what is being said.

I found it surprising that the key difference between these services was the presence of projection screens and new media, because it spoke to the complex feelings accompanying the introduction of ICT into some religious settings. Ministers described

offering two different services as "as an accepted part of ministering today", and others expressed concerns about holding multiple services. The most prominent concern was that traditional services tended to attract older members while younger adults were more likely to attend contemporary services. Ministers wanted to create a worship environment where *all* members could worship together. In conclusion, I was struck by ministers' opinions that some of their members found ICT to be at odds with their understanding of church worship and wondered how computer applications could be developed to bridge this divide, or could be relevant and reverent.

4.1.3 Increasing Congregant's Participation in Worship Services

Another characteristic prompting concerns among those I interviewed was a belief that multimedia services decreased worshippers' participation in worship. This finding echoes Schultze's (2002; 2004) concern that ICT distracts church members from a key aspect of collective worship and that is focusing on God's word. According to Schultze, living in accordance with God's plan is challenging and requires effort (2004). The more worship services mimic entertainment (e.g., what one would expect at a movie theater or rock concert) the greater the risk that church members will distance themselves from focusing on learning to live a life in accordance to what is written in the Bible. More than half of those I interviewed shared Shutlze's concerns and they expressed desire to increase church members' participation in church or their "religiosity."

Time spent on private religious activities outside of church is known as "non organizational religiosity." It is closely tied to "intrinsic religiosity," or the degree to which one integrates religiousness into their daily life. These are both correlated with building stronger ties between members and their churches (Koenig, Parkerson &

Meador, 1997; Peacock & Poloma, 1999). More broadly, increased religiosity contributes to positive life satisfaction because it provides social support and gives individuals' a "meaning to life" (Strawbridge, Shema, Cohen, Roberts & Kaplan, 1998). Thus, it is not surprising that pastors consistently preached about encouraging their parishioners to be more mindful of their faith outside of church. As one pastor described it:

> I am troubled that many of my members only devote one out of the 168 hours in a week to worshipping God on Sundays. How can I encourage them to give more time to God?

To increase participation and focus worshippers on the minister's sermons some participants told me they distributed worksheets during services and asked members to fill them out. Similar to teachers, pastors at these churches prepared outline slides to clarify material presented in their sermons. However, pastors at churches where worksheet were not used in services criticized this practice. Specifically, they said such practice were appropriate for the classroom rather than church worship, and that the rote act of filling in answers on a worksheet made faith "too easy." For example:

> I don't really think it is all that productive to make faith such a convenience . . . the sermon, we can get the content out there, but there is something about content and atmosphere that is powerful for spiritual benefit that we can't capture with technology.

This quote, like others was indicative of ministers' desire for members of their congregations to be mindful of their faith and to realize that being a Christian can sometimes be challenging. Like many of the accounts presented in this Chapter, the use of worksheets in services further illustrates how ICT have dramatically altered Protestant Christian worship settings.

Broadly, these findings suggest that the tension ministers described can be attributed to a mismatch between traditional worship practices and ICT. Computer

software and devices such as projection screens are not designed to support the "spiritual benefits" of worship. It also appears that ICT used in services have "baggage" associated with them that made them inappropriate for some worship services; ICT's ties to the classroom or corporate environments are the source of this baggage. For example, some ministers told me sanctuaries were environments with a "very different purpose" than secular ones and that ICT did not yet reflect these differences. The primary activity that takes place in Protestant Christian sanctuaries is collectively worshiping God; they are sacred spaces and thus differ from others because of their ties to the divine (Mazumdar & Mazumdar, 2004). I saw this as an opportunity to design a technology intervention that accounted for important aspects of Protestant Christian worship.

4.1.4 Preserving Communal Worship

As discussed in Chapter Two, some scholars suggest the future of church worship is online (The Barna Group, 2006). This speculation motivated studies investigating church worship in virtual environments and spurred interest among some religious organizations to develop "3D online churches" (e.g., http://www.churchoffools.com). A key difference afforded by these technologies is they allow individuals to worship alone, anywhere and anytime. Yet, in my study pastors overwhelmingly described the importance of corporate worship or physically coming together with other believers as a fundamental part of the Protestant Christian worship experience. For example:

> We need to be together, we need a sense of community, a sense of connecting and you do that when you are physically in worship together.

This quote echoed many ministers' responses to my questions about virtual churches:

> There basically a natural law that says, that the who of every part can produce more than any one individual part could produce by itself. So when we come together as a corporate body of

> believers we can do more, we can take back the city, take back the community, all being of one mind and one accord, and one place and that place is in the house of God, you can't do that by yourself or virtually.

A second concern ministers voiced regarding virtual forms of worship was the inability to perform the sacraments such as baptism, Eucharist and other activities that demand touch.

> Although computers can be pretty helpful they can also be pretty sterile, they can't hug you when you are feeling sad. They can't laugh with you when there is a joy that comes into your life. They can't baptize your newborn child . . .

During the conclusion of my interviews I asked ministers if they were concerned that virtual forms of worship would replace the type of services they were accustomed to leading. Ministers consistently answered "no" to this question. Some participants added that in the past there were concerns that television would replace physical forms of worship and this never occurred. Finally, three ministers said that physically coming together to worship God had persisted for hundred of year and they did not believe the Internet would replace physically coming together to worship. Minister shunning of online worship shaped my thinking about developing a technology intervention for worship services that preserves communal worship.

4.1.5 Discussion and Summary

In this section, I report findings from a study of the religious uses of technologies by pastors of Protestant Christian churches in the metro-Atlanta area. I found previously unreported factors ICT developers should consider when building software applications for worship settings. These characteristics include (1) a mismatch between the capabilities found in popular presentation software and churches' presentation needs; (2)

tensions surrounding "reverence" and "relevance"; (3) increasing congregant's participation; and 4) preserving communal worship. These factors guided the development of ChurchShare, a technology probe I deployed in different congregation to confirm or repute whether or not these factors can appropriately guide the development of ICT for worship settings. Specifically, I designed a website that preserves communal worship and attempts to increase church members' participation in services by allowing them to create the multimedia content projected on the screens in their churches' sanctuaries.

Collectively findings in this section highlight the boundaries of what constitutes acceptable adoption and use of technologies. My results also suggest there is no straightforward answer for ministers who struggle to balance their members' competing beliefs regarding the presence of ICT in worship services. Finally, these findings point to two additional factors to consider when developing ICT for worship settings. First, existing computing applications do not recognize and support important aspects of worship, particularly the "traditional" aspects. This omission suggests opportunities to develop applications that appropriately account for meaningful aspects of church worship, such as preserving communal worship. Second, there is an opportunity to develop more imaginative ICT that supports Protestant Christian worship. Arguably, prior efforts to develop virtual forms of worship do not account for the "physicalness" that is such a central part of church worship.

More broadly, these findings speak to similarities between how religious organizations and non-profit organizations use technology, an emerging topic for CSCW (Goecks et al., 2008; Le Dantec & Edwards, 2008b). Like the religious organizations I

examined, nonprofits obtain revenue from donations, work under tight financial constraints that affect their access to technical expertise and rely on volunteers to handle operations (e.g., lay helpers such as "ushers"). Yet churches are distinct from other nonprofits because the values that guide them are grounded in religious beliefs—instead of secular concerns—and they are lead by ministers—secular nonprofits do not have a counterpart to this role. Unlike an executive director of a non-profit counseling and teaching are significant aspects of a ministers' job. Thus, in both settings, choices about ICT use are motivated by utilitarian and altruistic reasons, but in religious organizations, these choices are also marked by spiritual beliefs and religious language. These differences make religious organizations a compelling entry point for understanding how dissimilar value systems shape ICT use.

4.2 Formative Study #2: Church Members

Following the first formative study, it became clear that churches faced issues adopting ICT that have been overlooked in prior HCC research, the most relevant being the tension around relevance and reverence. In my second formative study, I chose to interview church members to further investigate "What characteristics differentiate religious uses of ICT from secular uses?"

4.2.1 Study and Participants

The protocol used in this study was similar to the one used in the prior study. Unlike my study with ministers, I used Blythe et al.'s "technology biographies" during home tours (Blythe, Monk & Park, 2002). This involved participants taking me on tours of their homes, asking questions about technology usage and inquiring about the history of the items I saw. I scoped this approach by focusing questions on religious and faith-

related ICT use (e.g., When was the last time you used your computer for religious reasons?; Tell me about your church and online prayer requests.) Tours were broadened in other ways because I was interested in learning not just about ICT but other artifacts (e.g., paper notes, furniture and wall hangings) that potentially pertained to participants' religious practices.

All sessions lasted between one and one-and-a-half hours and participants were compensated with a $20 gift card. To find participants interested in participating in my research I posted an announcement on online bulleting boards (e.g., Craigslist.com), sent emails to ministers who participated in my initial formative studies and asked friends and colleagues to help me identify people to interview. I interviewed 20 individuals (15 women and 5 men) at 20 different homes. All interviewees lived in the metropolitan Atlanta area and ranged in age from 21–68 years old, with the median age being 35. Participants had various occupations including student, nutritionist, loan underwriter, and teacher. Eight participants described themselves as "born again" (having discovered or renewed a commitment to Jesus as one's personal savior), and the remainder used their denomination to characterize themselves (e.g., Southern Baptist or Presbyterian). All participants reported attending church at least once a month with 15 attending weekly. Every person interviewed was affiliated with a megachurch in the Atlanta area.

4.2.2 Findings

I present findings that draw from the analysis of 450 pages of transcribed interviews, approximately 100 photographs, and 50 pages of fieldnotes. I coded the interviews and fieldnotes looking for characteristics shaping participants' faith-oriented technology use. Themes uncovered in this study include: (1) characterizing faith-related

ICT use differently than secular use and (2) appropriating ICT for religious purposes. Within the first theme I describe three factors that applied to participants' faith-oriented use of technology but not to secular use. These characteristics are "identity expression and recruitment," "reflecting on the extraordinary," and "trusting online religious resources." Finally, I present accounts of users' attitudes about the presence of new media and projection systems in church worship. In contrast to ministers interviewed in the prior study, church members expressed little concern about ICT in their churches' sanctuaries. Later, I discuss how these findings influenced a technology intervention called ChurchShare.

4.2.3 Characterizing faith-related ICT use differently than secular use

One of the most surprising findings from this study was that participants clearly distinguish between faith-related and secular ICT use. For example, participants told me they used a conversational "tone" in their faith-related that differed from the one used in secular emails. In this section I also present the variety of ICT-based religious practices participants engaged in at home, the most notable being "reflecting on the extraordinary." Nearly all those I interviewed described serendipitous moments during their day when they were motivated or inspired to focus on "God's presence" in their daily life.

Emailing Prayer Requests: All participants made use of email for coordinating religious events like Bible study, receiving daily devotionals and engaging in online discussions about their faith. But prayer requests were the most prominent faith-oriented use of email. These were messages asking people to remember others in need of spiritual guidance, healing or emotional support. Participants consistently told me they treated these

messages differently from ones that were related to work or other secular communications. For example:

> The [emails] that are prayer requests are coming in as encouragement sometimes, those are, you know, those are very personal emails… Versus work, "Ok you need to get this done" It's just work, you know?

Church members either sent prayer requests directly to members of their churches or to congregational mailing lists. Participants sent and received one or two requests a week and three individuals reported receiving 10-12 requests per day. Regardless of number, participants distinguished these emails from secular ones. These emails had religious significance and were embedded into other routines such as creating prayer lists. Those I interviewed commonly wrote the names of individuals in need of prayer on lists and placed it on their refrigerator or beside their bed so they would be reminded to pray for people in need.

Previous research on email shows that it motivates people to connect to the Internet because of its conversational nature (Kraut, Scherlis, Mukhopadhyay, Manning & Keisler, 1996). Because email typically warrants replies, it engages people to want to log-on. Therefore, I asked participants how they knew a prayer request email was received or answered. Unlike secular emails, few participants expected a digital reply to their prayer requests; instead they told me the reply came in an entirely different form as this quote illustrates:

> I believe that my prayers send those invisible guardian angels, and God honors it. But can I prove that? The only way… Who would know? No one will ever know, until we get to Heaven… I have no evidence.

This quote, like others, illustrates the one way nature of prayer requests. As participants explained, it is only by accounting for the offline that the reciprocal nature of the exchange can be fully understood. Interestingly, this quote also points to God's unseen nature in participants' lives. Indeed, there were many ways "invisible guardian angels" manifested in the lives of those I interviewed.

Another characteristic that differentiated faith-oriented email from secular messages was the "tone." In many cases, this meant being more thoughtful and taking more time when composing a faith-related message. For example:

> There's definitely a difference in tone. Administrative email is usually for an organizational thing. It's usually very lighthearted, very short. A [faith-related] email, I spend a lot of time writing. It's really a much more deep thing. You really get into it. It's sharing your faith, it's debating something that's central to your life. It's more important.

It is unlikely that religion is the sole reason for this change in tone. Rather I see it as being a question of prioritization. For participants, their faith was a means of making decisions about what was the most important email to deal with or devote time to. It highlighted how domestic email was not just "non-work" email, but also a medium appropriated in rich, different ways, depending on the context and purpose of its use. This finding echoes a consistent theme found in this study and the prior formative study—expectations surrounding ICT use for religious purposes differ from secular ICT use.

4.2.4 Using ICT to Support Faith

During my interviews with ministers, I was struck by the tension that resulted from the introduction of ICT into worship services and speculated that church members might experience a similar ambivalence when using ICT in ways related to their faith. Instead, I found the opposite. There were multiple ways Protestant Christian megachurch

members appropriated ICT to support their faith. In addition to sending prayer requests, participants also read the Bible online, engaged in online discussions about their faith and downloaded gospel music. Rather than being concerned about how ICT is changing their faith, participants embraced new technology and used it to do things they could not do in the past, such as engaging in online prayer with friends and family overseas. In the rest of this section, I provide examples of how ICT was integrated into participants' religious lives. Then, I describe two factors that applied to participants' faith-oriented use of technology but not to secular use: "reflecting on the extraordinary" and "trusting online religious resources."

Half of my participants reported watching sermons online. They enjoyed being able to watch sermons at an appropriate time for them, rather than when they were broadcast on television. This desire speaks to the importance of balancing time for religious viewing against competing uses of the computer within households. In addition to watching sermons from their own church, participants watched ministers' sermons at different churches. Some reported watching sermons from around the world, thus connecting their local religious community to a global one.

Two participants used Voice over IP software (e.g., Skype) to pray with individuals living overseas. Again, like sermon watching, people used ICT to make connections to a global community of faith. But my participants also made local connections. They told me how they sent mobile phone text messages drawn from the Bible to friends from their church and family. Finally, five participants replaced their paper Bibles with digital versions. These participants enjoyed being able to quickly find meaningful passages, a process that took more time using a paper Bible. Rather than

being at odds with their religious practices, those I interviewed used ICT in ways to support their faith in ways they could not have previously done.

Identity Expression and Recruitment: Participants also used ICT communicate their Christian identity to other Christians and non-believers. For example, participants included Biblical quotes in their signature files:

> I have a verse on my emails like a message and stuff; I put a few Scriptures up there. Depending on how I'm feeling, like there might be scriptures of encouragement or scripture describing who God is. Or just something I really liked and wanted everyone else to know about.

Others described leaving faith-related outgoing messages on their phones. For example:

> It's long [the message] but you would be amazed. I have bill collectors, preachers, friends that tell me they received so much encouragement from my outgoing messages.

These quotes demonstrate how some participants use ICT to evangelize, or spread their faith. These actions were not just an expression of their own values, but also something they wanted others to know about them and they also hoped would reach a new audience. This is not surprising since many participants were Evangelical Christians, but it does speak to the on-going use of ICT to spread the faith and recruit new participants and may suggest the desire to evangelize motivates some people to use ICT. Answering questions about religion and motivation to use ICT would require additional research.

This use of ICT highlights a dilemma: some uses of ICT create complex value interactions between researchers, designers and users. Of course this has always been the case, but I see this dilemma as not only persisting, but also increasing as HCI moves into

contexts where different value systems prevail (Winner, 1980). For example, as HCI4D takes HCI researchers to countries and cultures where religion has a more central and public role in daily life than in the U.S., so the nature of what constitutes appropriate ICT design will likely include faith-related applications. The question of whose values are embedded into the artifacts we design or the data that we report is a central challenge facing HCC research communities. One way that these value interactions manifest and can be considered is through the continued study religion of religion and technology. Later in this dissertation I elaborate on standpoint theory and its potential in offering designers/research a practical approach for surfacing value differences when evaluating ICT.

Reflecting on the Extraordinary: ICT and other artifacts played an important role in helping participants reflect on their faith. Some participants used computer screen savers, email signature files and non-digital artifacts such as paper notes to remind themselves to set aside thoughts of the ordinary and focus on the "extraordinary" or their relationship with the divine in their daily lives. As one young man explained:

> [The notes] always remind me... Like a lot of times I should be working for the Lord, rather than other people. And then I always try to remember that I'm working really hard, doing certain things, and people may not appreciate it, and I may get upset, I take a look at those and remember it doesn't matter what they think – it matters what the Lord thinks.

Participants shared similar stories about how their screen savers and signature files also prompted them to think about their relationship with God outside of Sunday worship. For example, I frequently encountered scenes from nature, flowers, sunrises, and so forth when looking at participants' home computers. Individuals told me these

images reminded them how their faith included the creation of these natural phenomena. Signature files served a similar function, although rather than imagery participants would frequently place a significant Bible verse in their file to remind them (and others) that God was active in every aspect of their life including their ICT use. Broadly, participants modified ICT so they accounted for a meaningful aspect of their life—their Christian faith.

There were other ways participants reflected on the extraordinary in their everyday lives that were not tied to ICT. Many participants described serendipitous encounters that prompted them to think about their faith, or as one participant described it "God's presence" in her life. The following quote epitomizes this phenomenon that many participants told me they experienced:

> Every now and then, I see something that makes me say a quick prayer. Like I'll be walking down the street and it's a beautiful day or something so I will say "thank you God, for the wonderful weather you have given me" and stuff like that. I try to do the whole pray constantly kind of things. It's an idea a good friend of mine was talking about. He said we normally talk about and are influenced most by the things we think about the most. The example he gave was a video game, like if you just started playing a game you are going to be thinking about it a lot, and it is what you are going to be talking about with your friends. So instead of the video games, you can replace it with God, it is important to have God on your mind all the time.

Individuals told me about unexpected times throughout the day when they found themselves thinking about "what God is doing" in their lives. For some this feeling was tied to the weather, for others God's presence was evident in unplanned actions like giving money to an individual in need or unexpected news events such as the September 11, 2001 terrorist attacks.

Trust: As previously stated, church members did not have the same concerns surrounding ICT that ministers expressed. Interestingly the one tension regarding these megachurch members' use of ICT was related to trusting the religious information they found online. Five participants commented on the difficulty of knowing whether WWW resources provided reliable and accurate information about their faith. For example:

> It kind of confuses people and, you know, you are trying to learn about Christianity and find something you never heard of, like, there was a site saying Jesus has a baby!

This finding suggests online religious investigations are subject to questions about data veracity similar to health-related uses of ICT. When I probed to understand how participants determined what information they could trust online, all said they looked for website affiliated with a trusted source, such as Joyce Meyer Ministries or North Point Community Church. Participants also consistently told me if information was on their church's website or came directly from their church (e.g., via email) they trusted it.

4.2.5 Members' Attitudes towards ICT in Worship

During my interviews with pastors, I found that the introduction of ICT into worship services created a tension between staying relevant and reverent. To explore this from another perspective, I asked megachurch members to share their opinions about ICT in worship services to confirm or repute what ministers told me. All but two participants described enjoying new media in worship, meaning they preferred it over worship services lacking ICT.

When I asked participants to comment on the presence of ICT in worship, most spoke favorably of new media, saying that it made worship "less boring," and that the visuals helped them learn about the message being preached. For example:

> We have screens up in—all over that, you know, are continuously running, and it can be about what we're promoting now, you know, it could be on global mission it could be about vacation bible school—just different things. You know, I think it's good.

Or

> Uh, well, I mean, usually it's like a video tape of something, maybe an upcoming an event or something like . . .Well, I don't think they're distracting, they use the projections because it's effective, I think, you know, because it helps you learn, it also makes it a little bit modern, you know.

Rather than being concerned about the presence of new media, these participants were bothered by not being able to meet people, or engage in social fellowship, with members of their church. More than half of those interviewed described this as being the biggest difference between their experiences attending a smaller church and attending a megachurch. For example:

> It's Faith Christian Center. In Smyrna, Georgia. And it has, they say about 2000-3000 members. Which is very different from the church that I grew up in. . . My church that I grew up in was much smaller. And basically, it's harder in this church, harder to find the intimate relationship that you have with everybody as if in a smaller church.

Or

> Um, you know, it's funny, um, you see that if, you know, if, if you sit in the same area all the time, you're goin' see kind of the same people. So everybody kind of gravitates to their normal spot or their familiar spot—but sometimes it is hard to meet new people.

Perhaps it is not surprising that as churches grow larger it is difficult for members to build and sustain personal relationships with each other. However, this is problematic because social fellowship is central to attending church (Crowley, 2007). Ministers noted

this and church members described wanting more opportunities to interact with each other.

This finding also confirms Sturgill's (2004) research. Specifically, after analyzing 300 Southern Baptist Churches' websites she concluded few opportunities exist for church members to actively create and share personal content with each other. Sturgill speculates this is due to churches relying on their websites to attract new members, instead of meeting the needs of existing ones. Finally, this finding counters Bell's (2006) claim that technologies that deliver religious experiences represent the "leading edge" of a much larger re-purposing of the Internet. Instead, it appears that Protestant Christian churches are "behind" in terms of incorporating social-networking into their webpage. Seemingly, incorporating social networking in churches existing websites could provide opportunities for church members to engage in fellowship outside of Sunday worship. Of course this assumes Christians want to interact with members of their church throughout the week.

Although my findings suggest differences between ministers' concerns about ICT in worship and their members' concerns, one thing is consistent among both user groups. The technology used in worship services does not appear to support some meaningful aspects of church worship (e.g., educating members about God's word and the sacred nature of sanctuaries) but not all, the most significant aspect being fellowship.

4.2.6 Summary

In this section, I report findings from a study of Atlanta-area megachurch members' uses of technologies. My findings expands on those from the prior study and similarly suggest factors ICT developers should consider when developing computer

applications used for religious purpose. These factors include understanding that some Protestant Christians treat religious uses of technology differently from secular ones and some religious oriented websites are more trusted than others. Finally, my focus on Christians' faith gave me insights into aspects of ICT that are not readily accounted for in current applications such as my participants' serendipitous encounters with "God's presence" in their daily lives.

4.3 Formative Study #3: Observations at Megachurches

In this last section, I present findings from the observations made at Atlanta area megachurches. These observations, like findings from the previous studies, informed my thinking about technology, religion and motivated ChurchShare. Over the last five years I attended 112 services at 24 different churches in the metro-Atlanta area. I used the Hartford Institute for Religion Research's online database to locate churches with large weekly attendance rates.[7] Interestingly none of the churches included in the database or visited in this study were immigrant churches. As previously noted, the megachurch phenomenon seems restricted to congregation comprised of American-born worshippers.

I participated in Sunday services during my observations. This typically meant dressing appropriately, singing hymns, introducing myself to other attendees and placing money in the offering plate. I also collected artifacts (e.g., bulletins, flyers, and offering envelopes) to complement my observations. Following each visit detailed fieldnotes describing my experiences were generated. To help my analysis, I also explored the churches' websites, where I found additional information about their sanctuaries and the technology used in it. Eugene Medynskiy assisted me with coding some of the fieldnotes

[7] http://hirr.hartsem.edu/org

generated over the course of this study. Together we looked for commonalties in how ICT were used in megachurches.

Figure 3: Sample Presentation Backgrounds from ImageVine.com

4.3.1 Findings

Data analysis suggested several themes about how technology is changing church worship. In this section I focus on two sets of findings: (1) the use of large displays and (2) imagery in church services.

Centrality of Large Displays: Giant projection screens are the most prominent feature in the megachurch sanctuaries I observed. Indeed, large screens on both sides of a central stage were the first thing I noticed when entering sanctuaries. These screens served various purposes during services. For example, words to hymns were projected onto them, so were key "bullet points" from ministers' sermons and church announcements. Words to hymns and Bible verse were frequently displayed over a background depicting inspiring symbolic backdrops (e.g., the cross, mountains and sunsets) (Figure 3). It was

also common for the ministers to read selected Bible verses that were then be displayed on the screen. I observed parishioners following along and looking at screens to know what verse to turn to in their Bibles. The appearance of a new verse on the screen was followed by a flurry of page turning.

Displays were also used to share personal and administrative announcements during selected times during the service. Approximately 15-20 minutes of every service was devoted to passing a collection plate or bucket for the offering, or parishioners' financial contribution to the church. During this interlude administrative and personal messages were projected on screens. Examples of these events include upcoming church events such as conferences, prayer groups, Bible Studies, and small group meetings and more spiritual messages like prayer requests.

Large screens also made it possible for pastors to share videos during services. For example, I frequently observed videos of testimonials from church members on Sunday mornings. Testimonials are emotionally charged videos of people sharing God's impact in their lives with others during services. Common themes depicted in these videos included accounts of how God helped individuals recover from alcoholism, divorce, the loss of a loved one and persevere through an illness. Some churches chose to darken the worship setting, thus making the worship environment resemble a movie theater when showing testimonials.

It was common for the screens to show a close-up image of the minister during services. Seeing the church's leader—typically just his head cropped in the screen—made him seem larger than life and although in many instance I sat far away from the stage at the center of the sanctuary I felt as if the minister was close to me. Thus, I found myself

focused on what he was preaching. Megachurch members interviewed in my second formative study made similar comments about the affects of large screen in their churches' sanctuaries.

Finally, nothing was displayed on these screens during times before and after services. I often arrived at services 15-20 minutes before their starting times. This time is referred to as the "pre-service" and it is when worshippers enter the sanctuary, find their seats and wait for the sermon to begin. Some people engage in fellowship during this time or interact with other worshippers. Fellowship also took place after services as people exited the sanctuary.

Imagery: Constantly changing pictures of expansive clouds, flawless flowers and transcendent natural scenes commonly appeared as screens backdrops in services I observed. These images acted as backdrops to song lyrics and key points in ministers' sermons. They appeared larger than life on the screens and invoked words like "greatness", "perfection", and "grandeur" (see Figure 3). These were often the exact words ministers used in their sermons that commonly focused on what God was doing in his believers' lives. In many ways the images made visible, God's invisible nature in worshippers' lives.

During an informal interview with a church's media director I learned these images were available online from websites with names like "Imagevine," "Sermon Central," and "FaithVisuals." These sites charge churches a yearly fee for the use of their content and give ministers access to images and videos by popular artists like U2, Green Day and The Fray. Ministers can search these websites for pictures or movies on topics

such as the resurrection, family, and evangelism. Some sites even provide imagery related to specific Biblical passages. For example, imagery accompanying Psalm 63:1 is splashing water and clouds moving behind white cross are associated with the Bible verse John 15.

4.3.2 Discussion

The use of large displays in churches presents an interesting appropriation of technology in a unique context. The displays and the range of computer software that drives their output support practices that are not often explored in HCC research such as communal singing and worship. In this setting, large displays are used to heighten a spiritual experience, instead of furthering commonly considered goals such as improving the effectiveness or efficiency of a single individual or a group. Furthermore, the displays are integrated into an environment filled with strong traditions that simultaneously limit and highlight the possibilities offered by these devices.

4.4 From Empirical Findings to a Technology Probe

Findings from my formative study suggest religious individuals view ICT use related to faith-oriented activities as different from secular uses of the Internet. This finding and others guided ChurchShare, a photo-sharing website I evaluated to further understand what characteristics affect ICT adoption and how there characteristics vary among different congregations. Specifically, I deployed ChurchShare with users who broadly resemble those studied in HCI and in another congregation comprised of overlooked users—African immigrants. In the rest of this section, I provide an overview of ChurchShare then describe how findings my formative studies motivated the application and subsequent design decisions.

4.4.1 Design Overview: ChurchShare

ChurchShare was developed or API, thus photographs were uploaded, shared, and able to be downloaded in a way similar to this popular photo sharing site. Although ChurchShare functions like Flickr, I made the following design decisions that differentiate it from the secular site:

- ChurchShare's home page features religious images to distinguish it from secular photo-sharing sites.
- Users upload significant photographs from everyday life. This includes, but is not limited to, photographs documenting the many possible ways Christians experience God's presence in their lives. In addition to sharing photos with other church members the system has an offline component. To facilitate greater member involvement in worship services, pictures from the site are projected during before and after worship in churches' sanctuaries. Specifically, pictures are displayed 15 minutes before and 15 minutes following worship. These times are referred to as the "pre" and "post" service; they are informal time periods in-between formal worship.
- Finally, ChurchShare was designed to be lightweight, meaning it does not require significant time and skill to maintain. This decision allowed me to focus on the social and cultural dialogues surrounding the technology rather the technology itself during my deployments.

In the rest of this section I elaborate on how findings from my formative studies motivate this technology probe.

4.4.2 Design Decisions and Trade-offs

In Chapter Two, I outline prior research investigating virtual or online forms of worship. Ministers consistently told me virtual churches could not replicate communal worship and told me "physically coming together" is an important aspect of church life. Further, when I asked them, none of the church members interviewed told me they attended virtual churches, in contrast they said attending church on Sunday mornings was important, something they did not want to avoid or replace by watching services online. My focus on church leaders and members' *actual* experiences with ICT suggests prior efforts to replicate offline forms of worship online may be misguided. At the very least these efforts are "unimaginative" because they do not creatively take advantage of new technologies to support worship in ways that are respectful and mindful of believers' current practices (Brasher, 2001).

Findings from my research (e.g., the importance of physically coming together to worship) paired with Brasher's discussion motivated a key theme guiding ChurchShare's development. Rather then replicating a worship setting online, I developed an application that acknowledges and preserves physically coming together for worship. Further, church members had few qualms with using ICT to support their faith and consistently expressed a desire to be mindful of their faith outside of worship. Thus, I wanted to give religious individuals an opportunity to share their encounters with God outside of church with others during services, or inside church. I imagined that digital photography would be an appropriate medium Christians could use to account for these meaningful moments in their lives.

Mindfulness of Faith and Digital Photography: A strong theme across the material artifacts I encountered was their role in helping participants reflect on their Christian faith. Plaques with images of the sun rising, clouds in the sky or mountain landscapes were ubiquitous in participants' homes, on the materials distributed at church and on t-shirts and book covers in the Christian book stores I visited throughout my study. Participants said these images helped them stay mindful of their faith outside of Sunday worship services and it appeared that ministers used them to visualize God's invisible nature in their sermons. This finding paired with an understanding that participants wanted more opportunities to integrate ICT with their desire to think about God's presence in their daily lives—or reflect on the extraordinary—was central in motivating ChurchShare. Specifically, because of the widespread use of digital cameras and resulting increase in the number of pictures taken I claimed megachurch members would take digital photographs to account for God's presence in their daily lives.

Given the explosion of products and services for doing "digital photography" it struck me as a sound choice of mediums because it is ubiquitous, accessible and promotes spontaneous photo taking and sharing (Voida & Mynatt, 2005). Studies of digital camera use demonstrate how these devices are changing individuals' photo practices (Rodden & Wood, 2003). For example, traditional paper photographs were largely used to support memories about past events among friends and family members (Chalfen, 1987), but digital photographs are used for additional purposes and are shared with a broader range of people (Miller & Edwards, 2007). Other uses of digital photography include: self-expression; making art; creating and maintaining social relationships; and communicating one's membership in an organization. These are

functions "traditional" paper photographs do not widely support (Kindberg, Spasojevic, Fleck & Sellen, 2005b; Mäkelä, Giller, Tscheligi & Sefelin, 2000; Van House, 2007; Voida & Mynatt, 2005). Moreover, the medium's spontaneous nature makes it attractive for exploring new forms of communication, such as capturing meaningful moments in everyday life. This reason—the spontaneous nature the digital photography—paralleled another consistent theme that appeared during my interviews with church members. Specifically, participants believe God speaks to them through spontaneous thoughts, pictures, and feelings.

Different from Secular Counterparts: Findings from my formative studies suggest Protestant Christian differentiate faith-related ICT use from secular use (Wyche & Grinter, 2009). Thus one design goal for my technology probe was to create a photo-sharing venue that differed from secular ones such as Flickr. These design differences manifested in two ways: (1) the goal of the site and (2) the website's appearance. Table three describes additional design goals and how I achieved them.

According to its website, the goal of the Flickr is to "help people make their photos available to the people who matter" and to "enable new ways to organize photos."[8] I developed a site with a different goal in mind. Specifically, ChurchShare was developed to help people make photos of "God's presence" available to members of their church during Sunday services. It was not designed to store photos or to allow users to share them with people outside of their church.

[8] www.Flickr.com

Figure 4: ChurchShare's Homepage

Figure 5: ChurchShare Diagram

ChurchShare's home page features religious images that distinguish it from secular photo-sharing sites. This decision is inline with Campbell's (2005) suggestion

that religious websites should visually communicate that they are "set apart" from their secular counterparts and with findings from my research suggesting religious individuals rely on imagery to stay mindful of their faith outside of church (Wyche and Grinter, 2009). Thus, a collection of images including a church, silhouette of a person praying, and sunrise, appear on the site's homepage and refreshed upon users' visit to the site (Figure 4). I chose to use these pictures because they were similar to images I encountered in participants' home and on books, posters and key chains in Christian bookstores. This contrasts Flickr.com's homepage that does note feature religiously oriented imagery.

Trust: It was also important that users trust ICT used to support their religious practices. Findings from my formative study indicate that religious individuals find it difficult to determine whether some Internet resources provide accurate information. For example, participants told me there were web pages that presented malicious and inaccurate information about Christianity. In response to this concern, I placed the church's logo (logos from churches participating in deployment studies) on the site's homepage to communicate the site is trustworthy. Further when announcing the study I told members from participating churches there minister approved my study, to reiterate that my project and the website were affiliated with an organization they trusted, their church.

Figure 6: Changing imagery featured on ChurchShare's homepage

User Generated Content: Although Bell (2006) contends religious uses of technology represent the "leading edge of technology" use it appears some faiths are behind in appropriating new ICT. For example, as previously discussed church web pages are rarely used for social networking (Sturgill, 2004). Further, technological progress enables large parts of the population to access and afford new ways of interaction and communication via the Internet's intelligent web services and fast broadband connections. User-generated content (UGC) "is one of the main features of this so-called participative web" (Shao, 2009). Examples of secular UGC abound, such as Wikipedia, YouTube and Twitter. There are multiple examples of churches posting content on such sites, but to my knowledge, there are no examples of churches asking their members to create content for worship services. My research suggests ministers want members of their churches to increase their participation in church and church members already use ICT to support their faith. Asking church members to create the content they view on Sunday morning is a potential way ICT can address these needs.

Table 3: Design Goals

Design Goals	Example
1. Create a photo-sharing venue that differed from secular photo-sharing sites	*ChurchShare's appearance (e.g., placing faith-oriented imagery on the website).*
2. Preserve physically coming together for worship	*ChurchShare allows church members to create content for worship services, thus providing them with another way to participate in Sunday worship services.*
3. Establish trust	*Placed church's logo on ChurchShare homepage to communicate that site was affiliated with their church.*
4. Promote fellowship at church	*Users only upload images to the website. I did not provide a dialogue box to support online discussions about imagery (like the discussion space on Flickr), in order to promote discussion offline.*
5. Support user generated content	*Users submit personal digital photographs to the website that are displayed in church.*
6. Build on users' existing ICT practices	*Created a faith-oriented website to extend the possible ways users could interact with ICT in ways related to their faith..*
7. Take advantage of churches existing ICT infrastructures	*Churches do not need additional equipment to use ChurchShare. The technology probe relies on computers, projectors and screens common in churches.*

Take advantage of existing infrastructures and user practices: Finally, I developed an application that takes advantage of the ICT resources available in churches. There were practical reasons for this, such as creating an application that uses churches' existing technology makes conducting a real world deployment feasible. I am a graduate student with limited financial and technical resources, thus developing an ICT that required supplying churches with new technology was outside the scope of my dissertation. More importantly, given that churches are sacred settings with established ways of doing things designed an application that was unobtrusive and complemented congregations' existing worship practices. ChurchShare takes advantage of the availability of large screens and projection systems in sanctuaries. Further, I took advantage of users' existing practices such as using the Internet to support their religious practices.

Trade-offs and Limitations: Design is about trade-offs and ChurchShare illustrates how trade-offs affect technology probe development. My desire to deploy a technology probe in a real-world setting and to develop an application that would not interfere with churches' existing worship practices were important factors guiding the design of ChurchShare. With more time and resources I could have developed a more complex application and involved users during the latter stages of my design process. For example, ChurchShare could have been designed to accommodate images taken with cameras integrated into mobile phones in addition to stand alone digital cameras. Flickr developed an iPhone app that allows users to directly and instantly upload images (via email) to their online photo-sharing website (Siegler, 2009). With unlimited financial resources I would develop a similar application for iPhones and distribute it (and an iPhone to individuals who did not own one) to participants prior to deploying ChurchShare. Of course this study would highlight other issues to consider when evaluating technology probes, such as to what degree would the novelty of using an iPhone interfere with participants' desires to document God's presence in their lives. The benefits of such a study and re-designed application would be that it could potentially motivate participants to take pictures of their serendipitous encounters because prior research suggests individuals use camera phones for "in the moment" photos more than digital cameras (Kindberg, Spasojevic, Fleck & Sellen, 2005a). This potential study like the one presented in this chapter demonstrates how designers work with the constraints presented to them to create the best solution to problems (Wolf, Rode, Sussman & Kellog, 2006). Thus, it is important to recognize how trade-offs affect the design of a technology probe and reported findings from a deployment study.

Finally, there was a rigid separation between the data collection and design phase of this project. In other words, although ChurchShare was informed by users, the concept solely originated from me. My research is guided by methodologies that favor more involvement from participants in the design process (e.g., DBR) than I allowed for when developing ChurchShare. In future ICT design projects I plan to more actively involve users in the ideation process. This involvement can lead to improved learning, understanding and greater ownership of the project among users (Muller, 2003). My research questions assume that participants will *use* ChurchShare, thus increasing their involvement in every phase of the design process could potentially make them feel invested in the development of the probe and motivate use.

4.5 Discussion and Summary

Throughout this dissertation I make a distinction between the methodologies underlying the formative and deployment phases of my research. Specifically, I argue that deploying technology probes with users who are not the traditional targets of HCI research and development can lead to more meaningful results, or as Harding describes it "strong objectivity." The approach that guided the studies presented in Chapter Six could have easily guided the formative studies presented in this chapter. Indeed, a key tenant of standpoint epistemology is beginning investigations from the perspectives of those outside the community of investigators (Harding, 1991). Although I did not begin my research with Kenyan immigrants it was useful to initially examine participants who are the traditional targets of HCI research and technology development. Studying U.S. born Christians allowed me to gain an initial understanding about religion and ICT with participants who were accessible and easy for me to build rapport with during interviews.

Further, the experience gained from these studies provided me a point of comparison for later studies conducted with Kenyan immigrants. Put another way, I needed to understand the experiences of the dominant group before I could investigate members of a marginalized group.

In this chapter, I present three formative studies guided by design ethnography. Pairing interviews with church ministers and their members with observations at megachurches I uncovered factors designers should consider when developing ICT for religious purposes. Broadly, my findings suggest that churches may be able to take advantage of their members existing ICT practices to motivate new forms of participation in worship, that current software does not account for meaningful aspects of worship services or acknowledge that Christians distinguish between faith-related and secular ICT use. I developed ChurchShare as a response to these findings and describe two real world deployments of the system in the following chapters. Deploying ChurchShare allowed me to uncover additional factors that affect the adoption and rejection of ICT in religious settings determine if these confirm or differ from those presented in this chapter.

CHAPTER 5: EVALUATING CHURCHSHARE IN A CHURCH WITH U.S. BORN MEMBERS

In this chapter I present findings from a three-month, real world deployment of ChurchShare in a church comprised of "ideal users," or those who were intended to use the probe. In the process I answer the following questions: What characteristics affect ICT adoption (and rejection) among American born church members? and What new ICT practices emerged among church members during the deployment of ChurchShare? More importantly, this study provides a foundation for thinking about deploying a technology probe in a church, and combined with the second deployment at a Kenyan immigrant church, serves as a context for comparative research. Specifically, I compare findings from this study with those from the second study to illustrate how deploying a technology probes with ideal users differs from deploying it with unimagined or marginalized users.

Findings from this study confirm and differ from those reported in the previous chapter. The most prominent contradictions uncovered were (1) a disconnect between participant's desire to stay mindful of their faith outside of Sunday worship and their actions and (2) church members did not necessarily differentiate between faith-oriented and secular ICT use. Thus, asking users to interact with ChurchShare allowed me gain additional insights into religion and computing that could not be achieved through interviews and observations alone.

Finally, and most relevant to the overall argument made in my dissertation, the study presented in this chapter resembles typical HCI evaluation studies. I developed a

technology probe grounded in findings from user research and asked users who resembled those in my formative research to use the probe (Bardzell, 2010). Standpoint theory did not guide this study, thus inline with Harding's notion of strong objectivity I contend the findings in this chapter are "weak" because they are based on interviews with individuals who are the traditional targets of HCI research and technology development.

5.1 The Study

The main goals of this study were to understand whether ChurchShare could be effectively embedded into a church, to determine if digital photography was an effective medium to promote participation in worship services, and if Protestant Christians would use photography to capture God's presence in their lives. To answer my research questions, I conducted a real-use study of the website over a three-month period. In the process of addressing these goals and conducting a second deployment at a Kenyan immigrant church I was prompted to reflect on the differences in evaluating a technology probe with different users, specifically those who I imagined using ChurchShare and those I did not imagine using the website.

Throughout the deployment I observed, participated in Sunday worship services and conducted interviews with members of the church and their minister. Overall, 258 images were submitted and a subset of these images were displayed before and after six Sunday worship services. Sixteen different church members sent pictures to ChurchShare and dozens of members viewed these photographs before and after worship services.

5.1.1 Site Selection, Participants, Gaining Access, the Deployment, and Data Collection

In this section I provide details about my field site and methods that were not included in Chapter Three. For this deployment, I asked worshippers at a small (~250

members and ~45-70 regular attendees) Christian evangelical church in suburban Atlanta to participate in my research. Services at this church took place on Sunday mornings at 10:30 a.m. and ended at approximately 1 p.m. Prior to my study I had never attended this church or interacted with its members. I chose to deploy ChurchShare here to eliminate some of the bias in the study. Specifically, I speculated that if participants had a close relationship with me that would affect their use (or non use) of the website. However, I did interview "Justin" [9] the minister at this church during my initial formative studies. He expressed an interest in knowing about my research following our initial interview that took place three years before me contacting him about the deployment study. His interest and desire to assist me with my study were additional reasons I conducted my first deployment at this church.

Participants: Although, this church was not strictly a megachurch—because it did not have 2000 regular attendees—its members shared characteristics common among megachurch attendees. These characteristics included being young (the average age of a megachurch member is 40), coming from a different church before attending their current church, more likely to be female than male and being college educated (Thumma, Travis & Warren, 2007). I learned this information during my interviews with the church's minister during the formative phase of my project and confirmed during the three months I observed members at the church. Indeed, these characteristics also describe me and these similarities made it easy for me to build rapport and gain access to participants in

[9] Participants' names have been changed to preserve their anonymity.

this community; a process that proved to be more difficult in the Kenyan immigrant church. Finally, participants from formative study #2 shared these characteristics.

The deployment: On November 16, 2008, I made an initial five minute announcement about my study in front of the congregation. Justin introduced me during the "announcements" portion of the service and encouraged his congregation to participate in my study. Using PowerPoint slides I told the congregation I was a graduate student at the Georgia Institute of Technology, described my formative studies with megachurch leaders and members and described my project (Appendix B). I also asked members to take digital photographs documenting "God's presence in their daily lives" and told them these photos would be projected before and after worship services. To reinforce my announcement and to make people aware of my study who were not at the November 16 church services, I also distributed flyers at the church. As the study progressed I made another announcement during worship services and asked the church's administrator "Jenny" to include an announcement about the deployment in the weekly email sent to church members.

Data Collection: Findings presented in this chapter are based on interviews conducted with members of the church (including their minister), my weekly observations at the church and photographs uploaded to the ChurchShare website or sent to me via email using "sendpics@church-share.com." Observations were conducted in twelve Sunday morning worship services. This included time spent observing church members before and after the hour and half worship services. During my fourth week at the church, I

received enough pictures from participants and began projecting them in the church's café. I continued to do this on five more occasions.

Data analysis included interview data and all the pictures submitted via email and uploaded to ChurchShare, including images that were not projected following church services. Like the data collection, and analysis in my formative studies, data collection and analysis during the deployment was guided by the constant comparative method or I looked for key issues, and recurrent events in the data that became categories to focus on. Photographs were coded and the following themes emerged: nature, architecture, religious symbols, abstractions and snapshots of people. The most common types of photographs submitted were classified as nature or snapshots of people. I discuss participants' motivations for submitting these pictures later in this chapter.

5.2 Findings from Deployment Study

In this section I present findings from the deployment of ChurchShare. First, I present an overview of the data collected during the deployment. Second, I describe findings from interviews conducted with the church's minister that indicate ChurchShare was compatible with his organization, but that changes needed to be made to the site to insure greater use among members of his church. Specifically, he emphasized that I make the website as "easy as possible" for people to upload pictures. This was a common refrain members of the church also voiced and suggests there is a disconnect between Christians' desire to be more mindful of their faith Monday through Saturday—a theme uncovered in formative study #2—and Christians' motivations to devote time and to use ICT to do this. Third, I present characteristics affecting users' use of the website including: familiarity with ICT, economic incentive and desire to be active in church.

Collectively, these findings suggest that some members of this church were familiar with using the Internet to upload and share photographs and were comfortable using digital photography to account for God's presence. My findings also indicate that offering church goers an economic incentive tied to their weekly tithing may be a useful way to promote ICT adoption in churches. I conclude with a discussion about the wider implications of these findings.

5.2.1 Overview of data collected

Over a 10-week period I generated 47 pages of fieldnotes, interviewed the minister on three occasions and a member of his staff twice. I also conducted interviews with 12 members of the congregation and collected 258 images uploaded by 16 different people. The number of pictures participants uploaded varied. For example two participants sent 1-2 pictures. Others sent 7-10 and one very active user sent 47 different pictures to be presented at church. Although 16 out of the approximately 50-70 people who regularly attended this church does not indicate widespread adoption, prior research indicates it is a common for only a few people to contribute in online communities and other people to act as lurkers (Nonnecke & Preece, 2000). Nearly all of these photos were projected at the church, however I chose not to project images with children in them and pictures of people who had not consented to be in the research study. Thus out of the 258 images submitted for the study, 82 were not projected at the church because they depicted adults and young children who had not consented to be in the study.

In addition to the 16 individuals who submitted photographs to ChurchShare, dozens of other members viewed the projected images before and after worship services in the church's café. Following six Sunday worship services a selection of the 176 images

submitted were projected in the church's café. The images were imported into PowerPoint and projected continuously in a loop for 30 to 45 minutes before and after worship services (Figure 7, right). During this time I asked individuals questions about the images. Findings from these interviews are presented later in this chapter.

Unlike the interviews conducted at the Kenyan church I had little difficulty in finding individuals interested in participating in my study. I attribute my ease in gaining access and building rapport with these participants to our shared context. For example, like many members of this church I am white, a U.S. citizen and product on a mainline denomination church.

5.2.2 Making the Application Compatible with the Church and Users' practices

Prior to deploying ChurchShare I interviewed the church's minister. As noted in Chapter Four, ministers are responsible for the spiritual guidance of their church members, are key decision makers in their organizations and are considered to be knowledgeable about the broader needs and concerns in their congregations. Thus in many ways ministers are "key informants" and using them to gain insights into an organizations' inner-working is a common practice in HCC (Millen 2000).

The church's leader agreed with the ideas motivating ChurchShare and granted me permission to conduct my study with his congregation. His agreement to participate is significant because it suggests that he found the application compatible with his organization. Indeed, not all ministers I contacted about being in the study agreed to participate. Justin told me members of his congregation who do not participate in the band or serve as ushers lacked alternative ways to participate in services and that he has attempted to incorporate "artistic" activities into Sunday worship services. A desire to

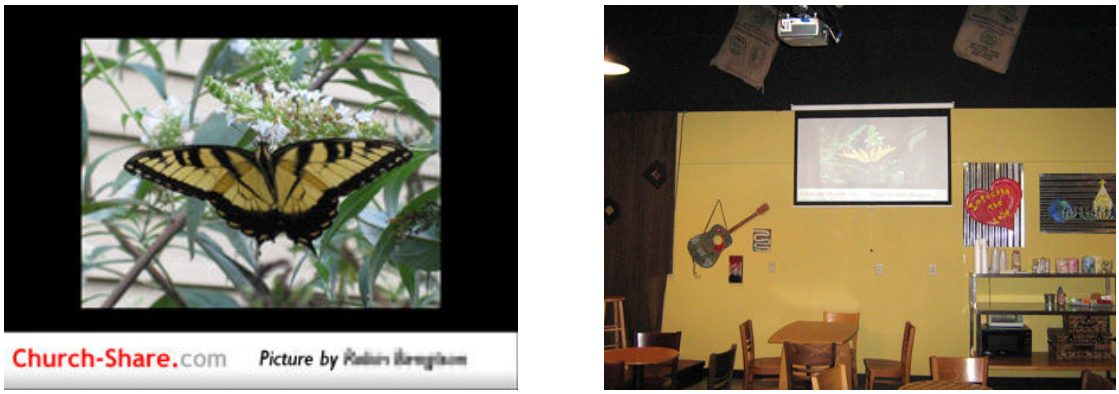

Figure 7: Template for Projected Photos (left); Church's Café (right)

offer religious individuals more ways to participate (specifically by creating media for worship services) in church motivated ChurhShare's development. However, as I learned during my formative interviews with ministers introducing ICT into religious environments is rarely straightforward. During this interview Justin asked me to make two changes so that ChurchShare would be more compatible with his church and members' existing ICT practices. The first change was to alter where I planned to project the images. Second, changes needed to be made to ChurchShare so that it would require as little time as possible for church members to upload pictures.

Rather than projecting images in the church's sanctuary Justin explained that I should project photographs from ChurchShare in their "café" (Figure 7, right). Prior to entering the church's sanctuary there is a foyer where coffee and pastries are served before services. According to Justin this is done to promote fellowship among members and to provide new members with opportunities to meet established ones. This area was also equipped with a projector and screen.

Observations made at churches during formative study #3 suggested pre- and post-service times were best suited for projecting images. That was not the case at this

church because members congregated in the café—rather than the sanctuary—before and after services. These finding highlights the "messiness" that accompanies conducting deployments in the real world and speak to difference within Protestant Christian churches. Specifically, during the observations at megachurch discussed in Chapter Four, I saw fellowship taking place in the sanctuary. However, at this church members tended to congregate in the café. Differences in the physical size of megachurches and this smaller church may explain why fellowship took place in the foyer rather than the sanctuary. The sanctuary at this church was much smaller than the ones described in formative study #3.

During our interview Justin also told me members of his church are "very busy" and to make accommodations for this in my study. Dual-income families with young children represented the majority of people in his congregation. Other researchers also describe these individuals as "busy" because they feel pressure in trying to comply with expectations attached to their roles as parents, which adds to an already stressful existence (Barnett, 1994; Cowan, 1989). The minister expressed concerns about members' ability to "find the time" to upload images to ChurchShare and added that I make sending pictures "as easy as possible." Further, he lamented that members of his congregation did not make more time for their faith:

> If your child had cancer you make time for it because it is so important. I don't want to equate God with cancer, but God is important and I wish members would make more time for him.

This concern echoed what ministers told me during formative study #1 and motivated ChurchShare. I developed the website so Protestant Christians could "make more time" for God and reflect on their faith outside of Sunday services. However, it appeared there was a disconnect between Christians' desires to be more mindful of their

faith Monday through Saturday and their motivations to devote time and to use ICT for this purpose.

In response to Justin's concerns I changed ChurchShare's design to give users more options in terms of how they could send pictures to be projected at church by adding an email address—*sendpics@church-share.com*—to website (Figure 8). This decision contradicted my initial desire to communicate to users that ChurchShare was a devoted website and was not integrated into other ICT practices, such as email. However, Justin wanted his members to participate and speculated that by making submitting photos compatible with their current ICT practices and routines this would be more likely to happen.

5.2.3 Financial Crisis and Offering an Economic Incentive

Members at this church used my website as evidenced by the number of pictures I

Figure 8: Screenshot from ChurchShare.com

received. This suggests within this church members understood that ChurchShare was an acceptable way to share images with other members and validates some findings from my formative studies. However, use of the website and photo submission occurred after I offered to contribute $0.10 to the church for every photo received and included an announcement describing my study in the weekly email sent to church members (Appendix C). In the rest of this section I describe my motivation for choosing to compensate participants and in the process illustrate how unpredictable contextual factors affected my study.

Two weeks after my initial announcement, no pictures were uploaded and reports from Google Analytics indicated that nobody visited the ChurchShare website. Perhaps I could have given church members more time to use ChurchShare, but in order to stimulate interest in my project I offered to donate $0.10 for every picture I received. This decision was also motivated by the minister's discussions about the church's struggle to pay its operating costs (e.g., heating and electricity) which was a result of decreased tithing among members. The decline in church tithing reflected the economic challenges other churches experienced during the financial crisis of 2007-2010. These challenges were well documented in the popular press (e.g., "American Pass Economic Woes to Churches")[10] and concerns about money were prominent in Justin's sermons and members' prayer requests. For example, prayers asking for guidance about employment were commonly requested during services.

[10] This is one example of many stories in the media documenting the impact of the economic downturn on church members' giving. The cited article is available online :http://www.christianpost.com/article/20081201/americans-pass-economic-woes-to-churches/index.html.

The severity of the churches' financial problems became clear during an interview I conducted with Jenny. In late January I drove to the church to talk to her about including an email about my project in the monthly email she sent to church members. When I entered her office I observed Jenny wearing several layers of clothing and huddled near a small space heater beneath her desk. She told me the church "cut-off" the heat and "unnecessary lights" Monday through Saturday to save money. I was not prepared to conduct an interview in such a cold environment and was uncomfortably cold during the hour-long session.

Once learning about the church's severe financial challenges, I made another announcement two weeks following my initial one informing church members of the changes in my study and redesigned the flyer announcing my study to also reflect this change. The following quote the church's minister made after I announced the changes in my study design suggested my decision to compensate members for photographs was useful:

> You guys better start uploading some pictures!

The following excerpt from my fieldnotes further confirms that my decision was appropriate:

> As I walked back to my seat I overheard someone say "money talks." As I took my seat a man sitting behind me tapped me on the shoulder and asked me how I decided on 10 cents. I was stuck and didn't know what to say. He added there were 300 members in the church. For a moment I got a bit worried. How much money would I be doling out?

The phrase "money talks" struck me, because as noted earlier I claimed Christian's desire to participate in church and to use ICT to be mindful of "God's presence" in their lives would motivate them to participate in my project. However,

increased interest and use of the site following my announcement suggests more tangible forms of compensations might be necessary to motivate Christians to recognize and document the extraordinary moments in their lives.

5.2.4 Familiarity with ICT

Following my decision to compensate church members, individuals sent dozens of digital photos to the email address on the site's homepage or uploaded them to ChurchShare. Broadly, use of ChurchShare revealed that members of this church were familiar with ICT in ways that members of the church where the second deployment took place were not. In this section I present findings that speak to church members' familiarity with various forms of technology and in the process confirm some findings from my formative studies.

In addition to offering $0.10 for every photo sent I asked the church's administrator to include an announcement about my research in the weekly email she sent to the congregation. Findings from my formative studies indicated churches rely heavily on email communication to share news and other relevant information, such as prayer requests (Wyche et al., 2006). Thus, pairing an email announcement with distributing flyers at services would be an effective way to communicate my study to as many members of the church as possible. Jenny included in the email that I would put money in the collection plate that was passed during every service for each picture I received (Appendix C). Following these changes to my study design, church members began visiting the website and sending photographs to be displayed before and after services. This finding confirms results from my formative studies. Specifically, ministers and church members rely heavily on email because it is an effective way to communicate.

This appears to be common to both religious and secular organizations and confirms other research indicating that email is the most successful computer mediated collaboration application (Grudin, 1994).

More surprising was the fact that members of this church did not appear to differentiate between faith-oriented websites and secular ones, as suggested in my formative studies and Campbell's work (2005). For example, several members commented on the similarities between my website and Facebook, the popular social networking site. On four occasions I was asked why I didn't simply use an existing service like Facebook or Flickr for my research. For example:

> You might want to put ChurchShare on Facebook so that people can socialize on it, you really need that so people can socialize more.

I replied to this question citing findings from my formative research indicating Protestant Christian megachurch members treated their religious and secular ICT use differently and that I wanted an application that reflected that difference. Participants then told me it would be "easier" if the site was integrated with an existing application. These individuals appeared to be comfortable with integrating their faith-oriented ICT use with secular applications such as Facebook. Further, on four occasions, a member of the church requested that I "friend" them on Facebook and join their church's group page on the site. Again, these actions indicated that members of this church were familiar with (and comfortable using) ICT in ways not evident at the second church.

This desire to use Facebook also reflects the fast-paced growth of the site. Nearly two years elapsed between conducting my formative studies and the deployment study presented in this chapter. During that time Facebook evolved from a service meant for college students to one that became accessible to the general public (boyd & Ellison, 2007). Thus, my formative study was conducted with individuals who did not have access to the popular site and my deployment study was conducted with participants familiar with Facebook. Other evidence suggests it may be unnecessary to design websites specifically for faith-oriented purposes. For example, social networking sites developed specifically for churches exist, such as MyChurch.com, but anecdotal evidence indicates these sites are not widely used and that religious individuals commonly use Facebook to share information with fellow church members.

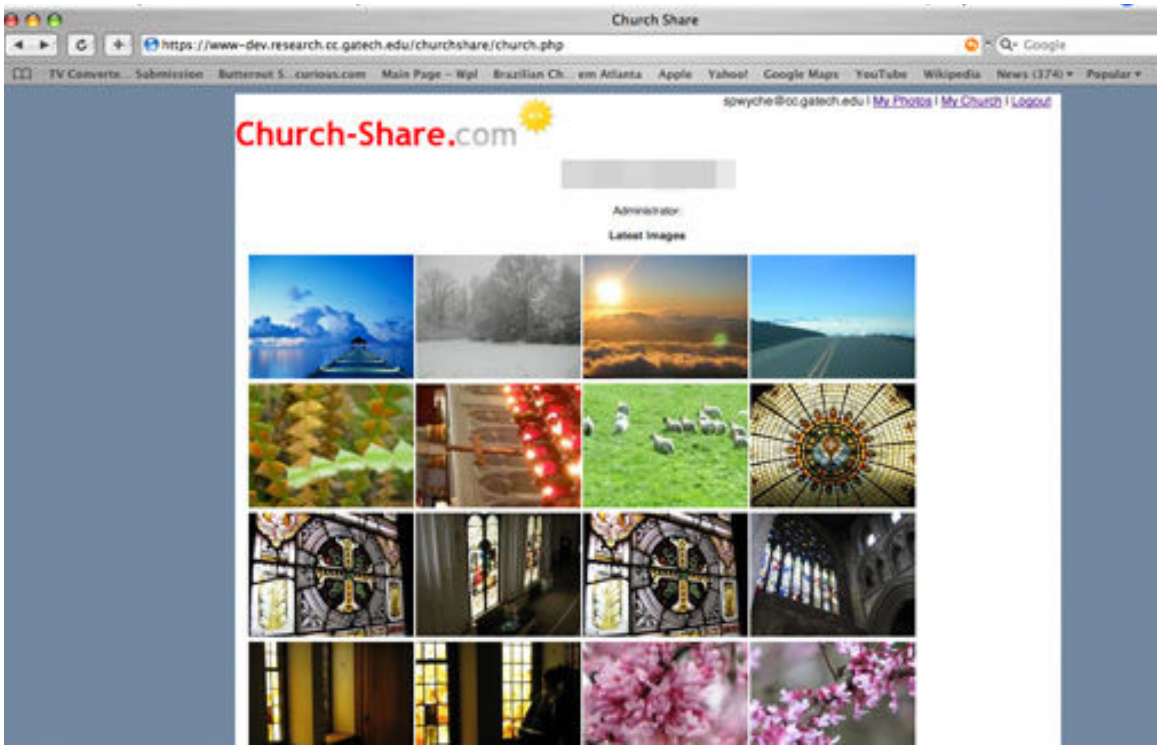

Figure 9: Screenshot from ChurchShare.com

5.2.5 Committed Members and Participation

Grudin argues that a "champion" is necessary to encourage the use and ultimate adoption of a system (Grudin, 1994). Within this deployment it was clear that the champions of ChurchShare were also the church's most "committed members." Committed members are those who attend services every week and play a key role sustaining a church's survival (Iannaccone, Olson & Stark, 1995). Churches rely on unpaid labor and volunteers to plan meetings, oversee Bible study groups and perform music during services. Surprisingly, ChurchShare was developed to offer church members additional ways to participate in church, but individuals who already participated at their church in various ways were most likely to use the application.

Those who submitted pictures to ChurchShare acted as ushers sang in the church's band and promoted using ChurchShare among their friends and family members. For example, "Jim," an employee of Starbucks Coffee Company, submitted four pictures and consistently came to church an hour early to prepare specialty coffee drinks for members during the fellowship period prior to worship. "Cynthia" and her husband "Troy" submitted 48 different pictures and were also members of the "praise and worship" band that performed every Sunday morning. During an interview with them they told me they encouraged their daughter and her friend to take digital photographs and submit them to the website. Out of the 16 different people who submitted photographs 11 were "committed members." I based this classification on my observations at the church and findings from informal interviews conducted with the church's minister. These individuals were also among the first to submit pictures and alerted me to technical problems they experienced with the website, thus further confirming their status as champions. This finding suggests photo-sharing websites might

be another outlet for committed church members to engage with their church, but not for members who have not yet committed.

5.2.6 Recycling Extraordinary Moments

As discussed in the previous Chapter, I chose digital photography as a medium for capturing God's presence because prior research suggests it is an accessible ICT that promotes spontaneous photo taking and sharing (Miller & Edwards, 2007; Voida & Mynatt, 2005). Digital photography's spontaneous nature seemed compatible with the serendipitous nature of participants' encounters with "God's presence." Thus I was surprised to learn that rather than taking pictures in their everyday life participants uploaded existing pictures. Rather than capturing extraordinary moments in their lives participants recycled ones from their past.

Examples of these images included digital photos from family vacations and church mission trips. One participant was a professional photographer and submitted meaningful images from her personal photo collection. When I asked church members why they uploaded existing photos they consistently told me, "it was easier." This confirmed Justin's belief that members of his church would not devote time to participating in my study unless I made it easy to submit pictures. It also supports the minister's claim that there is reluctance among members of his church to devote time to focusing on God's presence in their busy lives.

To emphasize my desire for people to take new pictures, I made digital cameras available to interested participants. The cameras I distributed had a clip so they could be attached to a purse, backpack or belt buckle to make them always accessible and available (Figure 10). The cameras were included in a packet with directions about using

the camera, information about my project and direction about how to use the ChurchShare website. Gaver's probe packets (1999) inspired the ones I created. Prior research suggests that if people are given "probes" and asked to take pictures of something (e.g., "something beautiful," "something desirable," or "your home") they will do so accordingly (Boehner, Vertesi, Sengers & Dourish, 2007; Gaver et al., 2001). Thus I assumed if I gave participants cameras and asked them to take a picture of "God's presence," they would use the cameras for this purpose.

I made the cameras available to church members on three occasions and one person took a packet. When I asked people if they would like a packet they typically told me they had their own digital cameras and did not need one. The individuals who took a camera returned it to two weeks after he took it. Unfortunately, no images were on the camera. Again, prior research suggests cultural probes are a useful way to collect data; however, this was not true in my study (Boehner et al., 2007). Perhaps I should have presented the packets to participants as a "gift" (as Gaver suggests) rather than asking participants whether or not they wanted one. This finding may also be inline with others from this study that suggest a disconnect between Christians' desire to reflect on God's presence outside of church and their desire to use ICT for this purpose. More broadly, this section illustrates the sort of reflection standpoint epistemology demands and represents how HCC researchers can be self-critical of their work.

Figure 10: Digital Cameras and Packets

5.2.7 God's Presence and Digital Photography

Findings from my deployment study differ from findings from my formative fieldwork. However, the variety of the images that were submitted to ChurchShare indicate that Christians see and feel God in diverse ways, thus confirming a finding from formative study #2. This quote from a participant describing why he chose to submit a picture of a friend riding a motorcycle illustrates this *feeling* Christians have and suggests digital photography can capture it:

> I see God's handiwork all around us, not only in sunsets or angel fish, but in what happens everyday. It is, the fun, the motion, the movement, I feel when riding my bike. It is all touched by God.

In this section, I provide additional details about photographs submitted over the course of my deployment. Participants most frequently submitted pictures of nature and family members to illustrate God's presence in their lives. Interestingly, this abstract feeling also manifested in the names participants gave to the submitted photographs. For example, submitted photos were annotated as "A gift AWPhoto.jpg," "true worshipper.jpg" and "birthday cake for jesus.jpg." Photographers annotate photos to associate them with groups of photos or to record the names of people and places

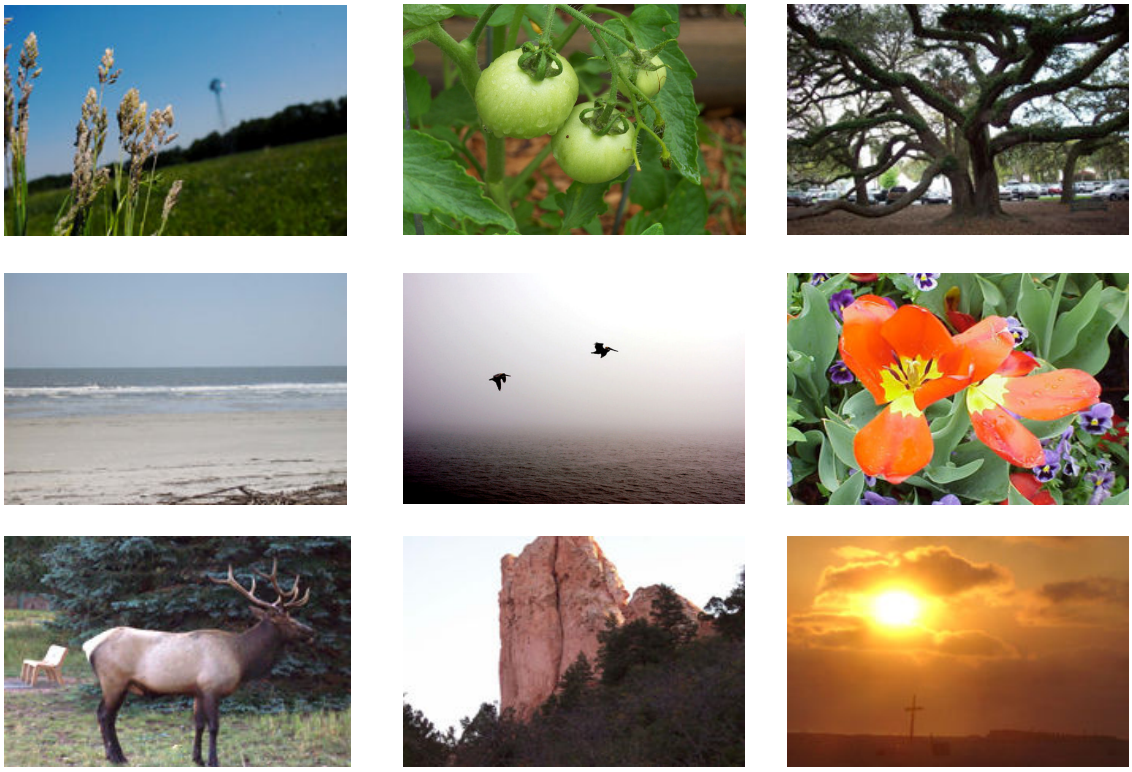

Figure 11: Uploaded Photographs Depicting Nature

depicted in the photos (Ames & Naaman, 2007; Rodden & Wood, 2003). My research indicates religion also affects annotations users give to their digital photographs.

"Nature" was the most common type of photo submitted. This category broadly included pictures of animals, flowers and landscapes (Figure 11). Interestingly, the church's minister described the images as resembling "stock photography." Stock photography is photographs that are produced in studios using a variety of models posing and, expressing stereotypical emotions. The images were also similar to ones I encountered at Christian bookstores, Christian websites and frequently saw projected during my observations at megachurches. I was struck by the similarity between participants' submitted images and those used as backdrops in worship services (see Figure 3, Chapter 4). It appears Christians share a common language in terms of how

Figure 12: Uploaded Photographs Depicting People

they visualize God's presence. The invisible is made visible in landscapes, sunsets, and rock formations.

The second most common type of photograph submitted were photos of other people (Figure 12). These pictures resembled personal family snapshots and some were given names such as "Coffin family.jpg," "big sister watching over baby bro.jpg" and "daddy loves his kids.jpg." When I asked a participant why she submitted these photos she replied:

> For me, many of the faces cause me to "see God" because I know the heart and life and story of the person in the photo....

As previously mentioned, I chose not to display these photographs because I was unable to obtain consent from everyone in the photos and would not project their images in public without permission. Further, I was not prepared to obtain the consent necessary to present photos depicting individuals under the age of 18.

Finally, no participants submitted pictures that were judged inappropriate. Prior to displaying the photographs they were sent to the church's minister for approval. This

suggests participants respected the sacred nature of their church. In other words, they understood what content was appropriate to share in this context and refrained from submitting imagery that might contradict the shared Christian values of those who attended their church.

5.2.8 Reactions to Projected Photographs

Although 16 individuals submitted photos to ChurchShare many more participated in my deployment because they watched the changing images projected on the screen in their church's foyer. I observed church members standing and sitting in the café watching the images on the large screen. During this time I approached individuals to interview them about the images and present findings from these encounters in this section. Participants consistently told me they learned "new things" about their fellow church members when looking at the pictures.

Church members submitted pictures to the website were able to benefit from the efforts of individuals who did not send photos. For example, an older man who consistently attended services with his wife and son told me the images "made him think about God in nature." He added that he had not thought about this at church before. Five individuals told me they "liked" the pictures. When I probed to understand what they liked about them I received various responses, including "I learn new things about people at church," and "I didn't realize they had vacationed there." The latter response was prompted by several pictures a family had uploaded documenting their trip to the Grand Canyon.

During my formative interviews with church members, many told me they wanted more opportunities to engage in fellowship with members of their church. This desire to

"know more" about the individuals they worshipped with on Sunday was evident in participants' responses during my interviews. Though these findings are preliminary they indicate that ICT may be able to support fellowship among church members. Specifically, collectively viewing pictures uploaded by church members has the potential to allow them to learn more personal information about each other.

Factors Inhibiting Use: Finally, although participants submitted pictures there were many people in the church who decided not to send images documenting "God's presence" in their lives. Indeed, out of a church comprised of ~250 members and ~70 regular attendees only 18 participated, or attempted to participate in my study. During informal interviews following church services I asked individuals why they did not submit images and heard a variety of reasons. Some reasons were unsurprising and echoed prior research investigating collaborative systems such as "forgetting," and not having time to participate. This suggests some participants did not associate using ChurchShare with a desire participants commonly expressed in my formative studies—staying mindful of God's presence in their daily lives.

Other reasons for not participating were more surprising, including a reluctance to upload pictures of God's presence, as indicated by the following quote:

> It is too perfect, I am afraid my photography can't do it justice.

Although digital photography makes it possible for a wider range of people to take photos, this quote suggests some individuals believe their skills inhibit them from taking the type of pictures they want to take. Indeed, it was common for participants to

associate picture taking with artistic expression and some church members indicated that they lacked creativity necessary to participate. For example:

> I am a computer analysts, me and my wife are very literal and I didn't understand the types of pictures to post. I have a lot of photographs from being a missionary in Southeast Asia, but wasn't not sure if they would be appropriate. I thought it had to be more of an artsy picture.

Future ICT like ChurchShare should allow other ways for religious individuals to document God's presence in their lives. For example, participants could submit a favorite Bible verse to a shared website. Finally, no participants told me they did use the website for reasons of doctrine or rules set by their religion. Cases of not using technology because of reasons tied to individuals' faith have been reported among other religious groups, such as the Amish, Charismatic Pentecostals, and in some Orthodox Jewish communities (Campbell, 2007; Wyche et al., 2009b).

5.3 Discussion

Several interesting results emerged from this study, especially regarding the use of digital photography to account for God's presence in Christians' daily life and the potential benefits of collectively viewing photographs in church. Although, findings suggest photo-sharing has some potential in religious organization, they also suggest that widespread adoption of a system is governed by factors common in secular organizations, such as lack of motivation. In this discussion I elaborate on my finding and suggest their broader implications. Finally, I reflect on the objectivity of the findings presented in this chapter.

5.3.1. Merging Online and Offline

During my formative interviews with ministers, some expressed apprehensions about the increased presence of ICT in their members' daily lives. For a subset of these

participants this concern arose from fear that online forms of worship would replace communal worship, or physically coming together to worship God. ChurchShare is unique because rather than using ICT to replace communal worship it provides an opportunity for Protestant Christians to integrate ICT use outside of church with activities taking place at church. The minister's approval of my study and some members' adoption of ChurchShare indicates that developing ICT that merge online religious practice with offline ones (e.g., physically attending church) can surface more imaginative way to design ICT that support Protestant Christians' religious practices.

Other examples of integrating worshippers' online activities with worship in church include the phenomenon of "Twittering in Church" (Cheong, 2010). Twitter is a social network and micro blogging service that enables used to send and receive messages known as tweets (see Twitter: http://twitter.com/). Popular media reports suggest some megachurches allow members to tweet during services and these short messages are projected onto the screens during worship services. News articles report that ministers are integrating twitter into their services because, like ChurchShare, it offers church members a new way to participate in Sunday worship.

5.3.2 Local Imagery

As discussed earlier I did not expect members to send images of their children and family members to the website. However, participants submitted photographs documenting personal experiences in their lives such as the birth of a baby or a family vacation. This suggests members of this church thought the subject of these images represented "God's presence" in their lives and that participants were comfortable sharing these images with fellow church members. Prior research indicates concerns

about privacy abound among users of photo-sharing websites (Ahern, Eckles, Good, King, Naaman & Nair, 2007; Miller & Edwards, 2007; Van House, 2007). In contrast, my research indicates these concerns may be less relevant in religious organizations and highlights a potential new research question. Specifically, how does membership in a religious organization affects individuals' attitudes about sharing information online?

More importantly, this finding suggests church members' photo collections are valuable and under utilized resources. Crowley (2007) argues that imagery churches place in their printed material and include on their websites is not representative of the people who attend these churches. For example, people with disabilities or from a lower economic class are typically not represented on churches' websites. Predominately white congregations tend to show Caucasians on their website and Black churches' printed materials almost always depicts people of color. My analysis of churches' websites and the myriad of artifacts collected during my visits to churches confirm Crowley's findings. Members' photographs could replace the predictable stock imagery that is ubiquitous in churches' printed and online materials. In turn, this would provide church members with another opportunity to participate at their church and potentially save money.

5.3.3 Economic Incentive and Context in Evaluation Studies

In my original study design, I chose not to compensate individuals for participating in my research because I wanted to explore if altruistic reasons, such as a desire to share God's presence with fellow church members would motivate use. Indeed, I did not compensate individuals personally for participating in the study; instead I offered to donate money to the church. This suggests that ICT may be an effective way to encourage tithing among church members.

Tithing is the practice of paying a tenth part of one's income, as an offering to God. It originated in the Bible and is an integral element of the religious practices in most churches and central part of many Protestant Christians' lives (Dahl and Ransom, 1999). Churches currently use ICT to support tithing in two ways: placing ATMs in their buildings and allowing members to donate money on their websites. Connecting the act of tithing with another one such as creating content to share with other church members, points to a more creative way to use technology to support tithing.

More broadly, my decision to discuss the economic crisis illustrates how knowledge is socially situated in technology evaluation studies. Standpoint epistemology asserts that all knowledge is socially situated and requires the researcher to specify the location and contexts in witch their knowledge is produced (Haraway, 1988). Within HCC—particularly UbiComp research communities—context is broadly associated with artifacts, people or devices in a user's current environment (Dey, 2001). This definition of context motivates technological innovations such as mobile phones that turn themselves off before entering certain location or homes that automatically turn of light when someone leaves a room. Yet, this definition of context does not ask researchers to reflect on how situational factors affect ICT use and adoption. Accounting for historical events in technology evaluation studies—like the recent economic crisis— has the potential to lead to more objective claims about knowledge because it provides audience with knowledge about the messy factors that shape ICT evaluation studies.

5.3.4 Efficiency and techno-spiritual practices

Finally, deploying a probe in a church comprised of individuals who were similar to those interviewed in my formative study allowed me to more deeply understand their

relationship with technology in ways that interviews and observation alone could not. I was able to confirm some finding from these initial studies, but it was more common for my data to differed from what I learned the formative studies.

As discussed in Chapter Two, some HCC researchers suggest religion has much to offer the community because it counters traditionally tropes underlying ICT design such as efficiency (Bell, 2006a). Yet, it appears that efficiency was as important in this religious context as in secular ones. A consistent theme from my interviews with church members and their minister was a desire to make uploading pictures "quick" and "easy." Rather than becoming an act or ritual with sacred significance it appeared that the process of participating in my study felt like work for some individuals.

5.3.5 ICT Evaluation Studies and Strong Objectivity

In this dissertation I contend that standpoint theory can be useful in guiding ICT evaluation studies because this approach can highlight assumptions embedded in the design of computing applications. To illustrate the benefits of using standpoint theory to guide ICT evaluation studies I compare findings from this deployment study with the study described in the following chapter. I present this initial deployment study as an example of a *typical* evaluation study that was conducted with "ideal users." In contrast to the second deployment, standpoint theory did *not* guide this study, thus, inline with Harding's notion of strong objectivity I argue the findings in this chapter are weaker when compared to those in Chapter Six. I elaborate on this claim in this section.

In her recent paper, "Feminist HCI: Taking Stock and Outlining an Agenda for Design," Bardzell (2010) writes:

> Every design is founded on assumptions about users. As a field, user research helps us make these assumptions in reasoned ways. A byproduct of these assumptions is that every design

> projects its own "ideal user." The closer actual users conform to this ideal, the easier, or more powerfully, or more pleasurably they will interact with the design.

The design of ChurchShare was grounded in assumptions about users and my belief that they would use the technology probe as I intended it to be used. Indeed, my research questions assumed the application would be used during the deployment! Thus, my design reflects how Akrich's concept of I-methodology informed my design process. I developed an application for users—like me—who are familiar with taking digital photographs and sharing them online. Further, as Bardzell notes I grounded my design in user research that was motivated by my desire to uncover a "need" ICT could address—a common approach in HCI (Greenberg & Buxton, 2008). Then, I evaluated ChurchShare with people who resembled those who participated in my formative study, or "ideal users." Perhaps, with greater reflection I would have questioned whether a photo-sharing website was the most appropriate response to the needs uncovered in my formative studies, asked different research questions that did not assume the technology probe would be used, or integrated standpoint theory into my research earlier (opposed to DBR or DE). Regardless, this lack of reflection in my research process limits the objectivity of the findings in this chapter.

Strauss and Corbin define objectivity as (Strauss & Corbin, 1998):

> The ability to achieve a certain degree of distance from the research materials and to present them fairly; the ability to listen to the words of respondents and to give them a voice independent of that researcher.

Like my previous peer-reviewed and published qualitative studies (Wyche, 2006a; Wyche et al., 2009a) this definition guided my data collection and analysis during this study. I systematically analyzed data and employed accepted techniques to validate the

findings reported in this document (see Chapter Two, Section 3.3.5). Yet, findings from my second deployment study (see Chapter Six) prompted me to reflect on this definition of objectivity. Specifically, how did my assumptions that an ICT was the most appropriate response to the needs uncovered in my formative research and my decision to evaluate ChurchShare with ideal users impact my understanding of objectivity? More broadly, this study highlights an area that merits further discussion within HCC. Specifically, "need-finding" should not always guide the design process.

The rhetoric underlying the design process in HCI is "taking something from its existing state and moving it to a preferred state," (Zimmerman & Forlizzi, 2010). Perhaps this approach is useful in instances where determining a preferred state is relatively straightforward. For example, if an older adult wants to age-in-place a technology could be designed to make this happen, or move the older adults' existence to a preferred state. Participants in my formative studies wanted to be mindful of their Christian faith outside of church. ChurchShare was designed to respond to this need and, in turn, enable Christians to achieve a preferred state. The data collected does not suggest ChurchShare prompted this shift among participants, thus indicating it did not effectively meet a need uncovered in my formative research. However, deploying the probe was useful in helping me gain further insights into the interaction of popular religion and the appropriation of ICT. In prior work I argue that design sketches can also be used to achieve this deeper understanding of a complex topic (Wyche et al., 2008). Thus, working towards a preferred state should not always drive design; in contrast design can be used to uncover novel insights about individual's interactions with ICT.

5.4 Study Limitations

Although the findings from the ChurchShare deployment study were encouraging in that the application was used, it offered a way for church members to use digital photography to participate in worship and to share meaningful photographs with others; the study is not without its limitations. I outline these in this section and describe how I address some of them in the second deployment study.

This study reflects the "messiness" that accompanies conducting research in real world settings. Although conducting a real-use deployment study strengthens the ecological validity of the findings presented here there are other factors that limit the validity of my findings, such as history. Over the course of my deployment there were events that occurred outside of the study that affected participant's use of ChurchShare such as technical issues. The application was a research prototype developed by me and other students, thus the time and resources available meant that the design of the system was not as high of quality as a commercial system. The server hosting the site was also periodically unavailable during the deployment and this created frustration among participants who attempted to unsuccessfully upload images to the site.

As previously discussed, other events affected my findings such as religious holidays and the financial crisis of 2007-2010. My deployment occurred during the Christmas and New Year's holidays. Justin cautioned me that attendance at church declines during this period because families at his church take advantage of the time-off from work and school to travel and therefore do not attend church. Inconsistency in church attendance affected participation in study. Further, as discussed earlier the

financial crisis played a role in this study because it motivated me to offer participants compensation for submitting photos.

Finally, a significant limitation of this deployment that is addressed in the second deployment is that it was conducted with participants who have traditionally been included in the production of knowledge, thus I used standpoint theory to guide my second deployment. Although megachurches have been overlooked in prior HCC research, those who attend them are similar to participants typically examined in ICT studies. American-born Protestant Christians are ubiquitous. Particularly in the U.S. Reports suggest that over 80% of the country's population identifies as Christian, with a majority being Protestant (Hill, Lippy & Wilson, 2005). Indeed, it could be argued that participants in this study are likely to live in the homes that are the target of technological domestic interventions. Christians are likely to be participants in HCC studies and potentially trial users of new systems. I addressed this limitation in my second deployment by asking members of a Kenyan immigrant church to use ChurchShare.

CHAPTER 6: DEPLOYING CHURCHSHARE IN A KENYAN IMMIGRANT CHURCH: USING STANDPOINT THEORY

What would happen with ChurchShare if I deployed it in a setting that was similar to site described in the previous chapter—a church—but one comprised of Kenyan immigrants? Whereas the prior study took place with individuals who are the traditional targets of HCC research, I chose to conduct this deployment with users who are marginalized in computing research.

The following question was addressed in this study: What characteristics affect ICT adoption (and rejection) among church members at a Kenyan immigrant church? My findings indicate that religion had little to do with participant's decision not to use the website. Instead, ChurchShare was rejected for a variety of reasons including participants' unfamiliarity with uploading photographs online, not having access to a computer or the time to take photographs.

Whereas, findings from my initial deployment suggest the application is compatible with some religious organizations and that photography is a useful medium for capturing "God's presence" in daily life, the opposite was true at this church. During a four-month study *zero* pictures were uploaded to the website, despite me offering churchgoers an economic incentive and providing them with other ways to submit photos to be projected at church. Despite participants rejecting ChurchShare, I contend the finding in this study are more objective than findings from the prior study, because deploying the technology probe with Kenyan immigrants prompted me to critically

reflect on my research process. Harding argues that such reflection leads to stronger objectivity in empirical research (Harding, 1991).

6.1 The Study

I begin by elaborating on methods used in this deployment. Given that I present this study as a case study documenting how standpoint theory can guide ICT evaluation studies, it is important that I provide rich details about this field site and those I interviewed.

6.1.1 Site Selection

In order to find a field site, I searched the Internet for immigrant churches in the Atlanta-metro area and consulted with Dr. Carlos Cardoza-Orlandi at the Columbia Seminary in Decatur, GA. I chose to search for Kenyan immigrant churches because I conducted fieldwork in Nairobi investigating how ICT support religious practices two years prior to this study (June-August 2007) (Wyche et al., 2008) and I thought this experience would help me gain access to a immigrant church for my second study. Displaying knowledge of local distinctions meaningful to members is a way to reduce the social distance between them and a researcher and useful for gaining access to communities.

Nairobi was an ideal place to study religion and ICT use because—like Atlanta—it is site of intense Christian organizational activity, with churches always forming, growing and failing. Further, like other countries in sub-Saharan Africa Christianity has a remarkable strength and pervasive presence in daily life and in individuals' lives. Further, when individuals move to the U.S. from another country they bring the richness of their cultural and religious heritages to their new "home" (Burrell & Anderson, 2008; Pew

Forum on Religion & Public Life, 2006). Finally, Atlanta is home to one of the largest Kenyan immigrant communities in the U.S. (Gitahi, 2005). Thus, this was an accessible community. Although, immigrants are not surrogates for users in-country prior research suggests studying diasporic communities can help in understanding how to appropriately develop ICT for non-Western settings, though this prior work has not examined evaluating ICT with immigrant group (Foucault, et al., 2004; Best, et al., 2009; Irani, et al., 2010).

Searching online, I identified three churches comprised of Kenyan immigrants and emailed ministers at two that appeared to have the large congregations. These churches had their own buildings, whereas the one I chose not to contact met in a room housed in a strip mall. Emails were sent to two ministers and after two weeks neither responded to my request to meet with them to discuss my research. Rather than following up with a phone call I chose to attend services at the church with the most elaborate website because I speculated it had members who were accustomed to using the Internet in ways tied to their faith. This church's website was regularly updated unlike the other one I visited.

I found the church's address and the start time for their Sunday services on their website and decided to attend a service and talk to the minister about my study. Following the worship service, I introduced myself to the minister, gave him my business card and told him I would call him about scheduling a time to meet. I learned from my first deployment that it was important to have the minister's support before conducting a research project in a church.

Like the prior church where I deployed ChurchShare, characterizing this church as a megachurch was problematic. Rather than 2,000 members, this church had approximately 500 regular attendees. However, the church shared characteristics common to megachurches, such as it had a strong charismatic leader, appeared to be theologically conservative and was located in a suburb outside of a major city located in the U.S.'s "sunbelt" region. Unlike the church described in the prior chapter, this church was made up of Protestant and Catholic Christians and megachurches are defined as being comprised of Protestant Christians (Thumma, 2006). Immigrant churches tend to include worshippers from various faith backgrounds because members often prioritize worshipping with individuals from their home countries rather than worshipping with those with a shared denominational background (Van Dijk, 2002).

6.1.2 Participants and Methods

I conducted two rounds of interviews over four-months, or following 16 Sundays services at the church. A total of 35 individuals were interviewed (24 men and 11 women). Participants differed along dimensions such as length of time in the U.S., ability to speak English, educational background, employment and faith background. Despite these differences and diversity within the congregation, there were characteristics shared among all those I interviewed. For example, all participants were born in Kenya and moved to the U.S., identified as Kikuyu—Kenya's most populous ethnic group—and in addition to speaking English participants spoke Swahili and Kikuyu. Many participants migrated to the U.S. for educational opportunities, and others came in hopes of findings more lucrative jobs than could be found in Kenya.

Prior to asking participants to participate in the interview, I made clear my affiliation with the Georgia Institute of Technology, my status as a Ph.D. student, my desire to digitally record interviews, and my intention to publish the material I gathered as a thesis and in conference papers. I also expressed my commitment to make the names and any identifying features of the people I interviewed anonymous through the use of pseudonyms. Additionally, I provided contact information for myself so individuals could follow-up with any concerns and questions via phone or email. This approach seemed successful and my interviews with members of the church were richly detailed and informative. However, four participants declined to have the interviews recorded and one participant declined to be interviewed because she did not speak English. I elaborate on other methodological issues encountered at the church later in this chapter. All interviews were conducted following church services on Sundays and lasted 15-45 minutes. During the Sundays I attended services at the church I typically remained in the sanctuary for 2-3 hours following the end of services to recruit interview participants.

I conducted interviews before announcing the ChurchShare deployment to gather baseline data about participants' existing photo practices. Given that no participants used the system, the interviews I conducted after announcing ChurchShare focused on why it was not used rather than how it changed participants' photo practices. Indeed, this reflected an assumption embedded in my research questions. Conducting a deployment in this setting prompted to reflect on this assumption and others that I discuss in the following sections. I began interviews by asking participants how long they had lived in the U.S., how long they had attended the church and how they integrated ICT into their

everyday lives. Interviews concluded with questions about digital photography and church fellowship.

6.2 Findings

My findings draw from interview data and fieldnotes collected during my four-months at the Kenyan immigrant church. During that period I attended 16 worship services, conducted 32 interviews with church members, had three individual meetings with the church's minister and attended the church's "10 Year Anniversary" celebration, a weekend festival-like event that occurred during April, 2009.

The findings presented in this chapter answer the following question: What factors motivate ICT adoption or rejection in immigrant churches? In the process of answering this question, I also uncovered assumptions embedded in my study design and the ChurchShare application. More broadly, I used these findings to critique HCC research communities' tendency to design ICT for individuals who resemble them, a practice referred to as I-methodology (Akrich, 1995). I also present these findings as an example of how conducting research with marginalized user groups can prompt HCC researchers to reconsider their standpoint during every phase of a research project.

Themes consistently appearing in the data highlight assumptions about ICT adoption embedded in my application, such as: widespread use of social networking sites (SNS) and consistent access to personal computers. Data from interviews and observations collected after I announced ChurchShare to the congregation pointed to other factors that inhibited use of the website such as lack of awareness about my study. Finally, I comment on how being a white, "unmarried" woman, researcher affected the

deployment and discuss the broader implications of this project. Reflecting on your biases and identity as a researcher is an important element of standpoint theory.

6.2.1 Assumptions Embedded in Study Design

There is little guidance on how to deploy a technology probe in church settings, so I used the same study design employed in my previous deployment because findings from it were encouraging. However, prior to the deployment and conducting interviews with church members, I found that changes needed to be made to my study design. These changes were uncovered during a series of interviews conducted with the church's leader. I coded these interviews looking for minister's comments on how to carry out my study so that members of his church would be interested in participating. As previously discussed, ministers are "key informants" and I interviewed them to gain broader insights about their church's inner-workings. These factors are grouped under the following themes: shared experiences and shared culture.

Shared Experiences: During my initial meeting with Dr. Kimani[11] I described my background, research interests and desire to conduct my study in his church. The 50-year old, father of two was dressed in a neat grey suit, was eager to talk with me and wanted to assist me with my project. He listened to me describe ChurchShare, my study and agreed to let me deploy the technology probe in his church. However, he emphasized that I demonstrate to members of his church that I had some familiarity with their cultural context. He told me most members of his congregation were unaccustomed to interacting

[11] Participants' names have been changed to preserve their anonymity.

with Americans and added that it would be important to share my experiences from Kenya to lessen the degree that I was seen as an "outsider." For example:

> Mention Ya-Ya Center. Mention the churches you visited, talk about eating uji and drinking tea. Share as much of your experiences with them.

Ya-Ya center is a popular shopping center that I frequented during my stay in Nairobi and uji is an important part of the Kenyan diet. Millet and corn flour is mixed with water to create a batter that resembles porridge. I recalled drinking uji many times in Nairobi. It was typically served to me during in-home interviews I conducted, accompanied by pieces of flat bread and tea or "chai." The process of serving me ugi, bread and tea, was a way for participants to welcome me into their homes. Perhaps most Americans are unfamiliar with uji and communicating to members of the church that I consumed it on many occasions helped me demonstrate *some* familiarity with their cultural context. Indeed, during my interviews with members of the church I found that talking about Kenyan food and places I visited was useful in building rapport with some individuals. This contrasted experiences at the previous church where less effort was required in order for me to build rapport with interviewees. In contrast, members of the initial church were eager to talk to me about the Georgia Institute of Technology and many noted the popular rivalry between my university and another nearby school.

Shared Culture: Dr. Kimani taught an anthropology course at a local university and told me some of his U.S. born students seemed "uncomfortable" when he asked them to visit his church or to engage in church sponsored activities (e.g., a summer Kenya festival held at the church). One of his favorite phrases to use in the classroom was:

> He who does not travel thinks his mother is the best cook.

He wanted to teach students the importance of moving beyond their personal comfort zones because it exposed them to novel experiences. During our interviews he asked if I would be open to learning new things at his church, I assured him I was and he emphasized that I learn some important Swahili phrases and reconsider some of my proposed data collection methods.

Swahili is one of Kenya's official languages. During my six weeks of fieldwork in Nairobi I learned how to say "thank you," "nice to meet you," and "good bye" in Swahili. Dr. Kimani encouraged me to demonstrate my *limited* knowledge of Swahili as much as possible during my time at his church. He also wrote down some Swahili phrases that would be important for me to say when interacting with members of his congregation. The first was "bwana asifiwe," or "God be praised." This is a popular greeting among born again Christians. Dr. Kimani listened to me repeatedly say the phrase until my pronunciation was suitable. Like discussing drinking uji, speaking *some* Swahili, communicated to members of his church that I was more familiar with Kenyan culture than someone who had not visited the country. More importantly, saying praise the Lord in Swahili demonstrated that I shared participants' Christian faith. Having a sense of familiarity with participants' language is a commonly used approach for developing empathy with them (Bhopal, 2010).

There were other aspects of what Dr. Kimani described as "Kenyan culture" I would need to be aware of prior to conducting my study, such as different attitudes about time and communication. My study design called for conducting focus groups with church members before and after deploying ChurchShare to understand how the probe

affected participants' photo practices. Dr. Kimani suggested that I do not conduct focus groups at his church for the following reason:

> Members have a different notion of time than you do. If have a focus group that starts at 2, people will not come until 2:30, 3 or sometimes 4.

Thus, I chose to conduct one-on-one interviews with church members before and after announcing ChurchShare instead of focus groups. This change in my study design was significant because it forced me to reflect on how every stage of my research process was guided by what I learned from conducting qualitative research in the U.S. I previously conducted focus groups and never questioned whether or not participants would come at an agreed upon time (see (Wyche, 2006b)). This finding echoes other scholars' discussions regarding differences between developed and developing countries attitudes' towards promptness (Zerubavel, 1985). It also demonstrates how conducting research with Kenyan immigrants highlighted assumptions about time embedded in my study design.

Finally, another unexpected change to my study design involved changing my name. During my initial study I introduced myself as "Susan" to people. I put my full name "Susan Wyche" on all the flyers, PowerPoint slides and emails accompanying my study (Appendices B, C and D). Dr. Kimani encouraged me to adopt a Swahili name while I was at his church. During the second Sunday worship services I attended Dr. Kimani asked the older women in the congregation to "give me a name." I listened to the older women seated at the front of the sanctuary yell words I did not understand. After some discussion it was agreed upon that my name would be "Nyaguhie," which means "travel" in Swahili. I was told this name was suitable because I had travelled to different

countries. In response to this, I changed the name (from Susan to Nyaguhie) on the flyers and email messages associated with my study (Appendix E).

Findings in this section are based on a series of interviews conducted with a key informant at my field site. Standpoint theory guided my data analysis. In addition to helping me alter the design of my study, I uncovered how my assumptions about culture, language and time, shaped my study in ways incompatible with this user group. Although there is a sizeable literature outside of HCI and *some* within HCI (e.g., (Le Dantec & Edwards, 2008a)) exploring how race, class and gender relations affect research methodologies, there is little discussion about how researchers' nationality shapes data collection. Investigating these issues is imperative particularly now as HCC researchers evaluate ICT in non-western contexts.

6.2.2 Assumptions Embedded in Application

Though ChurchShare was not used in this context, the process of deploying the probe helped me uncover assumptions embedded in my design and more broadly embedded in discourse surrounding future ICT development. First, I assumed users of the site would be comfortable using social networking sites. Second, in order for ChurchShare to be successful users needed to have a computer, access to the Internet and time to take, organize and upload photos. Finally, prior HCI research indicates that digital photography had largely replaced traditional paper photography; however this was not the case within this church.

Familiarity with Social Networking Sites: During interviews I asked participants if they were members of social networking sites (e.g., MySpace, Facebook, and Flickr) and if

they shared digital photography on these sites. ChurchShare is similar to these websites and I wanted to know if participants used them before asking church members to upload pictures to the website. Further, the HCI community and the popular press continue to tout the popularity and ubiquity of SNS within student group (Ellison, Steinfield & Lampe, 2007). Yet, SNS use among immigrant groups is unexplored. Interestingly, participants consistently told me they were familiar with these websites but rarely used them. Reasons for this included: (1) concerns about control and trust (2) lack of consistent access to a computer and (3) "inconvenience."

Control and Trust: During my initial deployment, I was struck by U.S. born participants' willingness to share personal photographs with me and members of their church. The practice of uploading and sharing pictures on social networking sites was one these individuals were familiar with and it appeared they had few qualms with making their photos accessible to members of their church and anyone else who may see them projected in their church's café. Indeed, this familiarity and comfort with sharing photos was an assumption underlying ChurchShare's development. The degree of comfort participants had with sharing photos was significantly different among members of the Kenyan immigrant church. Participants desired a great deal of control over who saw their personal photographs and most were reluctant to post digital pictures online. For example:

> I don't have photos like on Facebook, I don't put anything, rarely do I put stuff online, so I mean, I have photos on my flash disk, some of them I have saved in a document on my computer, cause I know you I can only access them.

By saving pictures on her flash disk and personal computer she was able to control who accessed her photographs in ways she could not online. Like prior research suggests, those I interviewed at the Kenyan church took digital pictures and wanted to share them with friends and family, but they wanted to control who has access to them (Ahern et al., 2007; Miller & Edwards, 2007). This quote is representative of many I heard:

> So there is that issue of trust, and I only send my pictures to people I trust. If not they need to come to my house and see them.

Or

> Sometimes, I save them on my laptop, so when a visitor comes I can show them.

This participant would only send pictures via email to "trusted" individuals and rather than uploading pictures online she invited people to her house to view them on her personal computer. This finding also suggests that individuals valued the interaction accompanying looking at the images. For example, looking at pictures provided participants with an opportunity to invite friends over to their homes. Finally, no members of this church sent pictures to the *sendpics@church-share.com* email, suggesting it was not a trusted address.

Participants' desire to control personal images appeared to stem from concerns that their digital photographs could be altered. For example five participants shared stories about friends whose images had been changed in an unfavorable way. Other participants described themselves as "private people" and felt sharing photos online was incompatible with this, for example:

> So personally, I am a very private person, so I don't put all my business out there. Like people know what you were doing during Christmas, like where you were and who you were with. Like that stuff, I think you should reserve some things, not everything is meant for public.

When I probed to understand participants' reluctance to become members of social networking sites, it became clear that anxiety about not being able to control who accessed their online information was a key reason. For example, participants who worked low-wage jobs told me potential employers could potentially access their information and if they saw something unfavorable their employment could be jeopardized:

> Let me tell you when you are looking for a job, your employers they do a search of your name to see what comes up. They do it everywhere. I have heard of people who didn't get job because they pictures stuff on MySpace.

There was also uneasiness among participants about being associated with people online who posted pictures depicting activities that contradicted their Christian faith such as heavy drinking. This reluctance to post photos online was echoed by the church's photographer. "Timothy" was a professional photographer and a long term member of the church. He had a strict policy regarding posting pictures online:

> No, websites, no not websites, the Internet, has become almost like this thing they call MySpace and I stay away from those. My policy is, if I take your picture I do not post it online.

This reluctance to share information with church members manifested in other ways at the church. During a conversation with Dr. Kimani, he told me the church faced challenges when creating a directory. It is common for churches to create paper directories with members' pictures and contact information in them. However, Dr. Kimani told me members were reluctant to share this information with others in his

church. According to the minister, this reluctance was due to concerns about expired passports and visas. He added that many members of his congregation were afraid that if their address and phone was available it would make it easier to be found. Some members of his church had expired visas and were concerned about being deported. During interviews I did not ask participants about immigration status because it was not relevant to my research and may have made participants feel uncomfortable.

Limited Time, Computer Access and Know-how: Other assumptions embedded in my application included: users would have enough time to take, organize and upload photos to the website, have a dedicated computer to use and the knowledge about how to upload photographs. ChurchShare was motivated and guided by an "access, anywhere and anytime" design trope that arguably underlies most online applications (Wyche et al., 2010). For those I interviewed their access to the Internet remained tied to specific locations and specific times of the day or week.

Lack of time was a factor that prevented some church members from actively using social networking sites. For example, seven participants worked multiple jobs and said they did not have the spare time needed to create and sustain relationships online. When they did have time online they used it for more pressing activities such as writing emails to friends and family back home and in some cases looking for employment opportunities. For example:

> An email you see sometimes when I've come from work. I work 11 - 7 and go to sleep during the day. When I wake up my kids have come from school. I'm cooking for my kids. Then getting ready to go to night shift. So sometimes checking my email is not easy.

It appeared that gender also affected some participants' ability to access social networking sites. Again, a factor I did not encounter during my initial deployment. One married man who asked me not to digitally record our interview told me "only funny stuff" happens on sites like Facebook, Flickr and MySpace. He avoided them because his wife would not approve of him using them. Finally, four mothers told me they were rarely able to access their computers at home because they were too busy cleaning, cooking and taking care of their children. When these women did have free time their husbands or children were using the computer. For example:

> I think I would like to [use the Internet], but I really don't have time. Yeah I have I don't have time for MySpace. I know people do that. And they do text, I don't ever do text. No. Because the time it will take me to text I could have left a message.

And

> So you have to really cook and do all the other things. So normally getting to the email is pretty hard and you have to really create time for it. It's not something that is my priority.

Participants who did have time to use the computer told me their ability to use the Internet was limited because they did not have personal computers at home. They used their friends, neighbors, or employers' computer. Thus they were not able to access the Internet anytime or anywhere. For example, a 40 year old woman who lived in the U.S. for twelve years and worked as an at-home nurse would use her employer's personal computer:

> Yeah, I don't have my own computer, but my old lady who I take care of she usually tells me, she is free with me, and when we are doing nothing she says "you can use [the computer]." So I go there and read and read.

Interestingly, during my fieldwork in Nairobi I also found that individuals' use of ICT was limited by access to the Internet. Surprisingly, lack of personal Internet access at home also affects users in the U.S. a country where Internet access is characterized as ubiquitous and always accessible (Green, 2002).

Finally, participants told me they did not upload pictures to the Internet because they lacked the knowledge needed to do this activity. As a 30 year man bluntly told me:

> Kenyans are not known for uploading pictures.

This statement reflects a broader theme common in the data. Specifically, those interviewed were less accustomed to integrating ICT into their daily lives than individuals at the prior deployment site. This difference was reflected in the common refrain, "we didn't grew up seeing [technology]." And also in older participants' discussions about how their children would grow up with a familiarity using computers and the Internet that eluded their generation. For example:

> My kids may be much better with the Internet, with all of these other new technologies, because they fit in well. That is what they're growing up seeing. But me, I grew up not seeing that.

Findings suggesting that religious individuals wanted more opportunities to use ICT in ways tied to their religious faith motivate ChurchShare. However, it appears a desire to integrate ICT into religious life was not as strong among this group as it was among those I previously interviewed.

Inconvenience: The success of ChurchShare depended on participants taking digital photographs, organizing them and uploading them to the website or sending them as attachments to the sendpics@church-share.com website. When developing the website, I

assumed taking and sending digital photographs was a common practice. As Akrich (1995) contends I unwittingly assumed users I was designing for were like me. Also, prior HCI research suggests that digital photography has replaced traditional ways of exchanging photos, such as sending paper photos in the mail (Miller & Edwards, 2007; Rodden & Wood, 2003). My findings indicate digital photography is not changing photo sharing practices to the same degree within this user group as compared to others. Participants explained that traditional ways to exchange photos, such as having paper photos hand delivered to friends and family in Kenya was more "convenient" than using the Internet to send them.

To be clear, although participants did not appear to actively upload and exchange pictures online that does not mean they did not take and share photographs. Taking and exchanging photographs was important in participants' lives because pictures documented their "progress," or ability to build and establish a life in the U.S. Church members took photos to record their presence in a U.S.-Kenyan community and significant achievements such as buying a house, graduating from high school or college and sent photos home to friends and family in Kenya. In terms of sharing photographs what I found most interesting was that participants rarely used ICT to facilitate these exchanges. They used other means, for example:

> Fortunately, there are a lot of people going home almost on a weekly basis so they pass them on.

Or

> If I am sending hard copies, when I am sending a lot of pictures I send them with a person.

Rather than uploading pictures to a website or sending them via email it was more common for participants to send hard copies or a CD of the photographs with a member

of the church travelling to Kenya. When I probed to understand why this form of exchange was used, I was consistently told it was "convenient." This struck me because the dominant trope underlying ICT development was its role in making life more convenient for users (Cowan, 1989). Indeed, in my own mind I perceived sending and receiving photographs via email as more convenient than printing and mailing them.

I uncovered factors that made using a person rather than relying on ICT to exchange pictures more suitable for participants' context. Specifically, they sent photographs to friends and family living in infrastructure poor countries where access to high-speed and broadband Internet is limited. Exchanging and uploading images is an integral part of distributed collaboration and users with fast Internet connections can distribute photo attachments effortlessly. However, downloading and uploading large files can take hours without high-speed broadband, crippling some email software that does not allow users to refuse or defer attachments. Further, sending picture to friends and family in Kenya often meant forcing them to access a computer at a cyber café. Given that the Internet is vastly slower in Kenya than in most parts of the U.S., sending large files meant making someone spend extra time and money at a café. Thus asking a friend from the church to take pictures on a return trip to Kenya or even sending them in the mail was a preferred over the Internet.

> You see "Timothy" what he is doing? That is how we do it. I put in the – I can put those in the envelope and send them. I find it much easier. You know why? In my country, the Internet is so expensive, even to like to receive and to send they pay.

Timothy, the church's photographer, always gave customers an airmail envelope with their pictures when he distributed them (Figure 13). Finally, 11 participants told me their family members, especially older ones, did not know how to use a computer. This was another reason using other means of delivery was more appropriate given participants' context.

Figure 13: Photo of me taken by Timothy. Airmail envelope accompanied the photograph.

6.2.3 ChurchShare Rejection

After two months it became clear that members were not going to upload images to the ChurchShare website. I employed strategies that motivated participation in the prior study, such as offering an economic incentive for photographs and emailing an announcement to church members, but still received no photographs. In addition to not receiving any photos via email, data from Google analytics indicated that nobody was visiting the website. Subsequently, I changed the focus of my interviews from understanding participants' photo sharing practices to figuring out why they did not use the website. Although the aforementioned findings highlight key factors that prevented widespread use of ChurchShare, I found it useful to question participants about why they did not use the website because it surfaced additional differences between this church and

the prior one where I deployed the application. These findings are based on interviews conducted with 16 people; five participated in my initial round of interviews.

Inconsistent Communication: One reason ChurchShare was not used was because church members were unaware that I was conducting a study in their church. Initially, I found this surprising because I made two announcements during worship services, distributed flyers in the church for six weeks, posted a sign in the church's foyer (Figure 14), sent an email to the congregation and Dr. Kimani mentioned my project to worshippers on two occasions. When I probed to understand why participants had, not heard, of my project I realized that people preferred some forms of communication over others. For example, at the end of services, announcements about upcoming church-related events were projected onto the screen at the front of the sanctuary. However, some participants ignored these announcements; in fact they ignored the screen in the sanctuary because it distracted them from focusing on the minister throughout the service. If the minister did not speak about the announcements on the screen, some church members were not aware of them. This lack of a consistent way to communicate affected other aspects of church life. For example, members told me scheduling church events was challenging:

> Because we will call for meeting and someone will say, well I didn't know we had a meeting, and I will be thinking well, did you see it on the screen and they will be like, oh I don't look at that. I don't pay attention to that. And I am like why not? Well because I think I would rather, I am used to someone making an announcement.

Figure 14: ChurchShare flyers posted in church's foyer.

Interestingly, it was participants who identified as having a Catholic faith background who told me ICT in the sanctuary was "distracting" and that they worked to avoid it. Of course it is difficult to make generalizations between how Catholics and Protestants accept ICT in worship services based on my small sample, but this finding suggests there might be differences and points to future research opportunities. These differences appeared to affect how some people learned about events in the church and other announcements, such as my study.

During the initial ChurchShare deployment, I found that sending email to church members prompted them to upload pictures to the website. I asked the immigrant church's secretary to send an email to his congregation on two occasions. In the email I provided detailed information about how to use the website and ways for members to contact me if they had question about my project or using ChurchShare (Appendix D). Using Google analytics I monitored activity on ChurchShare and saw two additional visits to the sites following the email, but no pictures were uploaded. During my follow-up interviews it became clear that email was not a reliable way to communicate to

members with the Kenyan immigrant church, because members rarely checked it. This finding confirmed what Dr. Kimani told me during our initial meetings. In fact the church was beginning to experiment with sending messages to members using SMS because members were more likely receive a message on their phones before receiving it on a computer. Finally, the flyers did not appear to be an effective way to communicate my study.

Sundays I arrived early and placed a flyer inside the pamphlets distributed to worshippers as they entered the sanctuary. Unfortunately, it was common to see the flyers crumpled up and left on chairs on the sanctuary floor (Figure 15). I interpreted these actions as meaning that participants were not interested in my study.

Figure 15: Flyers left behind on chairs and on the floor of the sanctuary.

Despite my best efforts to communicate my study to as many members of the congregation as possible it appears that no strategy was effective. This is one reason ChurchShare was not adopted within this setting. However, understanding this rejection pointed to a key difference between the immigrant church and the non-immigrant church. Specifically, individuals who are born in the U.S. and have lived here most of their lives

appear to be more accustomed to receiving church related announcements via email compared to those I interviewed at the Kenyan immigrant church.

6.3 Discussion

6.3.1 Methodological Issues in an Immigrant Church

Before I discuss the broader implications of my findings, I wish to examine how my presence as a non-African, young, "unmarried" female researcher, played a significant role in what was said and how it was said during my fieldwork. Critiquing one's background and assumptions is important in producing strong objectivity, in contrast to positivism's weak objectivity that ignored the impact of researchers' biases, values and interests. Of course methodological issues existed at the other church where ChurchShare was deployed but my presence was different at this church. I elaborate on this difference, describe the methodological implications of it and discuss its broader meaning for HCC.

As mentioned previously, I spent six-weeks conducting fieldwork in Kenya two years prior to this study at the immigrant church. In Nairobi I received an overwhelming amount of attention from individuals I interacted with during my fieldwork and from nearly anyone else I encountered in my daily activities (e.g., shopping at the grocery store, waiting for a taxi at a hotel or ordering a cup of coffee). On a daily basis I was asked to explain myself, my reasons for being in Nairobi, my profession, my country of origin and my martial status.

I later learned establishing contact with foreigners frequently was perceived as a chance for networking and opportunity seeking. A drawback of this was whereas an inhabitant of the field site may envision a positive outcome from having me as a foreign

contact; the reality was it distracted me from my fieldwork. Further, some relationships resulted in awkward encounters when I was asked give money after my fieldwork was completed.

My experiences in Nairobi shaped how I approached entering the Kenyan immigrant church. Before entering the site I prepared by rehearsing answers to questions I expected to be asked such as, "Are you married?," "Do you have children?," and "Why did you choose to come here?" In contrast to my experience in Nairobi, where my presence drew attention and I was constantly asked questions about myself and the U.S., the opposite was true in this church where I felt that my presence was ignored. Few people asked me about myself and whereas my affiliation with Georgia Tech provided an opportunity for me to talk to people at non-immigrant churched that strategy failed at the immigrant church. I asked one trusted informant to comment on my presence at the church:

> We spend Monday through Saturday in your world and Sunday is the only day of the week for us to be in our world.

"Your world" referred to settings where the majority of people were like me in terms of their nationality and skin color. She added that members of the church were skeptical of "outsiders" and what they might want. This reflected a tension I felt at the church. On one hand people wanted to welcome me. Indeed churches by definition are places where anyone can join in fellowship and worship with others (Ammerman & Farnsley, 1997). On the other hand I was an outsider and my presence appeared to cause suspicion among some members. I overcame this challenge by continuing to come to church and taking advantage of individuals who were interested in knowing about my research and communicating that I shared their Christian faith. These individuals tended

to have advanced degrees and had lived in the U.S. for a long period of time. They appeared more comfortable interacting with an outsider than some members of the church and over time introduced me to people who wanted to be interviewed. Being an outsider affected my data collection in terms of who I interviewed and in participants' responses to my questions.

During my fieldwork at the Kenyan church, I found it easier to approach men to be interviewed and this is reflected in my skewed sample (n=24 men and 11 women). This could be attributed to the nature of my research, indeed, technology was perceived as a topic men knew more about than women. It could also be attributed to other motivations. For example, I was asked to accompany a man to dinner during one of my interviews and a drawback of making my phone number public knowledge (on the study flyers) was that two men saw it as an opportunity to call me wanting to discuss topics unrelated to ChurchShare.

My experience suggests that for HCC to be successful it must open its doors to a broader range of people. Thus, I advocate that greater objectivity can be achieved in HCC through increased diversity within the research community. Being a white, young, and female clearly shaped my ability to conduct research in this environment, and forced me to speculate about what would happen if other researchers conducted technology evaluations with user groups radically different from them. For example, would it lead to greater acceptance of failed technology deployment studies within HCC research communities? Despite the HCI communities' desire to be multidisciplinary and diverse, I was reminded of how homogenous the community is during the recent ACM SIGCHI Conference on Human Factors in Computing Systems (CHI). Indeed, conducting

observation and writing fieldnotes is not limited to this research context, but something I do all the time. The CHI "world" is clearly dominated by white, highly educated, researchers trained affiliated with western institutions. Changing the composition of a research community is difficult but, perhaps, asking these researchers to reflect on how their standpoints shape research is a more achievable goal. Fortunately, other scholars are beginning to ask HCC researchers to do this as evidenced by Irani et al.'s (2010) work on "postcolonial computing" and Bardzell's (2010) notable paper examining feminism and HCI. Both authors argue that HCI should draw Science and Technology Studies (S&TS), feminist and postcolonial studies to understand the complex engagement around technology design and evaluation in HCI. My research supports this argument and also highlights that one does not need to travel to sub-Saharan Africa to encounter issues surrounding power and legitimacy in HCI but can find them in their own backyards.

6.3.2 Gatekeepers as Champions

Technology champions have been found to facilitate the adoption of technological innovation (Kientz, 2008). In the prior deployment committed members acted as ChurchShare's champions; they submitted pictures to be projected at services and encouraged other members of their church to do so. Although, this church had committed members or those who regularly attended, held leadership positions and participated in the church's choir, they did not use or encourage others to use ChurchShare, something Grudin argues is critical for groupware adoption (Grudin 1994). If time permitted me to conduct another deployment at a Kenya immigrant church I would ask a member of the church to collaborate with me on the project. Specifically, I would ask these individuals

to submit pictures to the website and encourage other members of the church to do so. In other words, I would ask them to be a champion for the technology probe.

Anthropologists sometimes refer to such individuals as a "gatekeeper" and rely on them to gain access to marginalized groups. The role of gatekeepers can be crucial in gaining access to some communities, because "having a visible and respected individual who holds a position of authority, high respect or leadership" can introduce researchers to people to interview. Within HCI gatekeepers may also be useful in promoting use of a technology probe during an evaluation study, particularly among groups who are marginalized in HCC research. Gatekeepers are often in authority and act as a bridge to link researchers into a new social world, as a guide who points out what occurs and how culturally different actions are locally meaningful, and as a patron who helps to secure the trust of community members' (Tewksbury & Gagne, 2001).

Perhaps it was misguided of me, a white, privileged, researcher to stand up in-front of a church comprised on Kenya immigrants and ask them to participate in my project. Further, it was naïve to think that my brief experience in Nairobi, Kenya provided me with any substantial insights into Kenyan culture. As HCC researchers continue to broaden the contexts they investigates and practices studied the more important it will be to continue to reflect on the power dynamics embedded in ICT deployment studies and explore how gatekeepers can become champions in them.

6.3.3 Non-Users as Lead Users

I deployed ChurchShare in a church comprised of Kenyan immigrants because this user group is marginalized in HCC research. In the process of asking Kenyan immigrants to interact with my technology probe and subsequently learning why they

rejected it, I uncovered biases embedded in my research design and application. Interestingly, I also uncovered issues surrounding social networking sites, such as Facebook, that the bulk of the site's users are now facing, specifically issues around privacy.

Von Hippell (1986) defines lead users as those who present strong needs that will become more general months or years in the future. Lead users are often synonymous with early adopters, or people who are at the leading edge of adopting new forms of ICT (Von Hippel, 1986). In my research it appeared that those who rejected SNS were lead users because they experienced needs (e.g., more control over privacy) now faced by the general population. Thus, I contend there is potential for HCC researchers to learn about future trends by studying individual who reject new forms of ICT.

6.3.4 Materiality and ICT Design

Within HCI and related fields there is a desire to digitize photographs and other paper artifacts. Indeed, relying on paper charts and handwritten notes is described as a "burden" and frequently indentified as an opportunity for novel applications (e.g., (Hayes, Kientz, Truong, White, Abowd & Pering, 2004)). The advantages of digitizing materials are clear. Digital records are safer than paper because it is difficult to back paper up, they can be easily transferred and take up less space than paper. Yet, my study indicates the value of paper artifacts and suggests opportunities for designing ICT that are not based on digitizing artifacts.

Members of the Kenyan church valued the interactions surrounding paper photographs. These interactions included meeting with the church's photographer to review his latest pictures, sending packages of pictures "home" with a member of the

church visiting Kenya or inviting friends over to one's house to look at pictures. It was these sorts of interactions I originally wanted to create when developing ChurchShare. Specifically, I originally claimed a photo-sharing website would respond to church members' desires to engage in fellowship with church members more than they currently do (Wyche, 2008). It appears this was already happening at the Kenyan church. Thus, in the future I would like to investigate whether the practices surroundings paper photo sharing at the Kenyan church would be useful at churches similar to the one described in my initial deployment study. Perhaps, asking members of the U.S. born church to create and exchange paper photographs depicting "God's presence" would prompt them to reflect on their faith differently than asking them to use digital photography for this purpose.

The interactions surrounding the paper photographs at the Kenyan church also point to design opportunities that are not grounded in digitizing artifacts. Rather than focusing on digitizing photographs are their ways ICT can support the interactions surrounding paper photographs? Perhaps ICT could support ways that material artifacts can carry additional content. For example, "voice recorded postcards" allow individuals to send a recorded message with a paper photograph. In the future I would like to ask Kenyan immigrants to use these to when sending photographs home.

6.3.5 Increased Objectivity

According to standpoint theory, all phases of a research study—identifying issues, theorizing research questions, gathering and analyzing data, drawing conclusions, and using the knowledge produced—are conditioned to by the researcher's standpoint. Deeper and more objective knowledge results not from attempting to eliminate politics

from science but from embracing politics and reflexively adopting an appropriate standpoint (Harding, 1991). This definition of objectivity likely makes some HCC researchers uneasy because it undermines the scientific standard of objectivity that is highly valued in evaluation studies (Greenberg & Buxton, 2008). However, I contend the findings presented in this chapter are more objective than the findings presented in the prior chapter, because I used standpoint theory to guide my second deployment. This project highlights ways of improving data collection and the significance of reflecting on how one's identity shapes gaining access to participants. Further, the findings presented here have the potential generate debate among researchers about developing ICT for people who are not the traditional targets of HCC research and technology development. Such debates are crucial if designers and researchers are to develop ICT for users in developing countries who interact with technology in different ways that what is accustomed to in the U.S.

Finally, this deployment suggests that failure has much to offer HCC. Although it is commonly argued that failure is instructive, reports of failing designs are rare in HCI/ HCC literature (Gaver, Bowers, Kerridge, Boucher & Jarvis, 2009). Yet, as my evaluation indicates useful information can emerge from the rejection of a technology probe, particularly findings about how users and designers' values differ. Further, understanding why users reject an ICT can lead to more objective findings about the system when compared studies that assume adoption, because rejection can prompt designers/developers to reflect on the larger assumptions embedded in their applications.

6.4 Study Limitations

I have noted some obvious limitation to this study throughout this chapter. There is one more notable limitation that merits discussion—interview bias. Specifically, it was difficult to parse whether or not participants authentically answered my questions or were saying they thought I wanted to hear. Dr. Kimani forewarned me that Kenyans have a tendency to say "yes" to everything. Indeed, there were countless occasions when I asked people to be interviewed and they replied "yes, but can we do it next week?" The following week when I asked these individuals if they wanted to be interviewed they told me they did not have time and I eventually stopped asking. Further, during some interviews I introduced the ChurchShare application to participants, gave them a flyer, and encouraged them to use it. Participants eagerly told me they would use the site and liked the idea. However, no pictures were uploaded. When I followed up with these participants and asked why they did not use the site, they told me they forgot and added they would try to upload pictured the following week. As I mentioned earlier collaborating with a gatekeeper in future studies is a potential way I could have reduced this bias.

6.5 Summary

In this chapter, I presented a study conducted at a Kenya immigrant church to learn about factors that affect the adoption and rejection of ChurchShare. I analyzed qualitative interviews and fieldnotes from observation to uncover reasons why the probe was rejected and in the process uncovered assumption about ICT use that were embedded in the applications design and answered the following research question: What characteristics affect ICT adoption (and rejection) among church members at a Kenyan

immigrant church? More broadly, I present this chapter as a case study documenting how standpoint theory can guide ICT evaluation studies and lead to strong objectivity.

CHAPTER 7: DISCUSSION AND FUTURE WORK

Through the research explored in this dissertation, I found that using religion as a lens to investigate technology use provides an opportunity to critically reflect on assumptions embedded in computing use. Similarly, I found that incorporating standpoint theory into ICT evaluation studies provides an opportunity to reflect on assumptions embedded these and offers a practical way to uncover values differences in design. In addition to providing empirical evidence describing how Protestant Christians' use ICT in ways tied to their faith, I developed a technology probe and deployed it in two churches. Specifically, I compared findings from a deployment study conducted with users who broadly resemble those targeted by HCC research—western born users—with findings from a deployment conducted with users who are traditionally overlooked in HCC research—Kenyan immigrants. This resulted in a case study demonstrating how standpoint theory can guide evaluation studies. Further, I contend the results from my deployment with marginalized users are more objective than findings from my study conducted with ideal users.

Though my work only scratches the surface of possibilities in this area, the empirical evidence presented from my formative and deployment studies suggests there are more complex issues to investigate about religion, design and standpoint theory in HCC. In this final chapter, I elaborate on these issues and describe areas for future research.

7.1. Overall Dissertation Discussion Points

The discussions in the individual chapters for each of the studies presented in this dissertation focused on how the findings from the study reflected upon different design choices and their broader implications for HCC. In this section, I describe more general findings that were common across all studies. I begin discussing what religion has to offer HCC and then shift the discussion to focus on standpoint theory and its potential in guiding future ICT evaluation studies.

7.1.1 How is religion different?

The research presented here resembles traditional HCI research and deployment studies. Indeed, like other scholars, I conducted a series of formative studies that informed a design intervention that was evaluated with users. This begs the question, "Is designing for religious purposes different from designing for secular purposes?" The question of religion being a distinct topic is not new and others suggest that what differentiates religion from secular topics in believers' lives is faith's ties to the sacred and divine (Eliade, 1959). Like other researchers I saw how this distinction manifested in users' domestic life and technology use (Belk, Wallendorf & Sherry, 1989; Wyche & Grinter, 2009). Initially I thought there might be something different about designing for religion, but am no longer convinced there is a difference. However, I am convinced that continuing to explore the special status individuals ascribe to artifacts, ICT use and people that are connected to their Christian faith has much to contribute to HCC researchers' interest in health, sustainability and values.

Body and Soul: Recently HCC researchers have developed persuasive technologies to encourage positive physical behaviors (Consolvo et al., 2008). In my formative studies, I uncovered ways users are already using ICT to promote positive behaviors in their lives. These included playing gospel music, placing Bible verses on their mobile phone's wallpaper and searching for faith-related materials online. When I asked individuals why they did these activities many told me that CD players, mobile phones' screens, and the Internet were useful because they prompted them to stay mindful of their faith, or to live the positive lifestyle prescribed by the Bible (e.g., avoiding drugs, alcohol, and eating well). Indeed, Christianity provided some participants with guidance, comfort, and in some cases a "will to live."

HCC researchers can apply this finding to their work by accounting for individuals' physical and spiritual needs or—body and soul—when developing applications to promote healthy behaviors in western and non-western contexts. Medical researchers and psychologists have long debated religion's role in promoting healthy behaviors (Koenig, McCullough & Larson, 2001). Most agree that strong religious faith contributes to a reduction of stress, depression, and can encourage individuals to abandon unhealthy behaviors such as smoking. One way HCC can begin to account for religion in computing is by incorporating sacred imagery into applications' interfaces (Wyche et al., 2009a). Beyond design implications, my findings suggest that ICT designed to promote healthy behaviors should acknowledge the spiritual dimension in peoples' lives.

Sustainability: As discussed in Chapter Three, participants' relationships with faith-oriented ICT values differed from their relationship with some secular ICT. For example,

I was struck by how some participants were reluctant to discard faith-related artifacts (e.g., Bibles and notes on their refrigerators). This desire was most pronounced with a participant, who showed me her 20-year-old digital Bible, that she would not part with because of its significance to her. Compare this example with advertising that encourages us to upgrade hardware in order to take advantage of next generation services. Some computing devices might capitalize on what it means to get people to imbue digital objects with added value and significance so they become heirlooms or have added personal meaning that goes beyond their functionality. Understanding how religion shapes the meaning users give to computing devices can contribute to the HCI community's interest in developing sustainable domestic technologies.

Values: Throughout this dissertation I argued that as HCC develops ICT for cultures where religion has a more central and public role in daily life than it does in the U.S. they will encounter dilemmas regarding the nature of what constitutes appropriate ICT design and research. This dilemma stems from developing ICT for users, like Evangelical Christians, whose values may differ from those widely held by computer scientists and technology developers. My findings highlight a potential design opportunity that may conflict with some developers and designers personal value systems, take ICT for evangelism.

Creating technologies to extend individuals' abilities and current practices is a prominent theme in HCC research. Specifically researchers have developed applications that help people with loss of vision, older adults, and children with special needs, to navigate a world that was not designed for them. Perhaps attention is given to these

groups because their technology needs and ICT's potential benefits can be readily identified. During my interviews with ministers, I asked them how they wanted to use ICT in the future. All expressed a desire to use technology to evangelize, or to change nonbelievers into believers. Thus I identified a need among users—wanting to evangelize. Indeed, some churches' aggressive use of television and radio to convert people to their faith has been credited for Christianity continued popularity and growth (Bruce, 1990). Using mobile phones and social networking sites for evangelical purposes and to extend churches' current evangelizing practices, is a logical extension of these prior practices. Yet, this prompts complicated questions about how HCC research agendas are framed, what technological advances are motivated, and which remain unexplored. For example, What if individuals want to use ICT to support activities that contradict some technology developer's personal value systems? In turn, this poses even more complex questions such as, whose user needs are marginalized at the expense of furthering a western normative agenda about appropriate ICT use? Answering these questions demands that HCC/HCI researchers reflect on their standpoints and how they affect their research. Standpoint theory offers an accepted approach for guiding researchers in doing this.

7.1.2 Standpoint Theory and HCC: Strong Objectivity in Evaluation Studies

In this dissertation I argue that using standpoint theory to guide ICT evaluation studies can lead to more objective findings when compared to traditional HCI evaluation studies. In this section I discuss the broader impact of my research for HCC.

During the last decade, HCI and related communities have become increasingly interested in accounting for human values in the design of computer systems (Borning,

Friedman, Davis & Lin, 2005; Friedman, Kahn, Hagman, Severson & Gill, 2009). Freidman and her colleagues' "Value Sensitive Design" (VSD) methodology is a notable example of these efforts (Friedman & Kahn, 2003) This framework provides an approach to the design of technology that accounts for human values in a principled and systematic manner throughout the design process. Recently, HCI researchers argued a limitation of this approach is that it offers little methodological guidance regarding how to uncover values in the design process (Le Dantec, Poole & Wyche, 2009). In response Le Dantec and his colleagues present a collection of methods aimed at uncovering value differences between researchers and participants during the early phases of the design process. I extend Le Dantec's argument to evaluation studies because they remains central in HCI practice, research and are core component of what students are taught when learning about the discipline (Greenberg & Buxton, 2008).

Using Standpoint Theory to Surface Value Differences: Standpoint theory provides an alternative, yet complementary approach to VSD. Specifically, it provides practical guidance on how to uncover values differences between designers and users because it asks designers/researchers to reflect on their assumptions, think about how their beliefs affect their work, and then to evaluate their work with users with a different standpoint. For example, during the recent CHI conference in Atlanta, GA, "Skinput," a technology that appropriates the human body for acoustic transmission and allows skin to be used as an input surface was introduced (Harrison, Tan & Morris, 2010). Skinput makes use of a small projector embedded in an armband to beam an image onto a user's forearm or hand. When the user taps a menu item or other control icon on the skin, an acoustic detector

also in the armband analyzes the sound frequency to determine which region of the display has been activated. The research received a "Best Paper" prize at the conference and heralded in the popular press as "the next computer touch screen,[12]" indicating the research community highly valued the work. Yet, when describing the evaluation of the device the authors offer minimal details about their subjects. Readers are given participants' sex, informed they are from the "Greater Seattle area" and range in age from 20 to 56. Given that the device involves projecting light onto peoples' skins knowing the color of participants' skin seemed relevant, but this information was omitted from the paper. Integrating standpoint theory into the evaluation of Skinput could potentially uncover assumptions about who the developers imagined would use the device and how they would use it.

Why was this information about skin color not included? Why do all the images and media accompanying the paper show Caucasians (without tattoos) using the device? Is this an instance of I-methodology? The developers of the system are fair skinned; did they imagine other light skinned people using the system? Does light project similarly on light, dark, tattooed and scarred skin? I can only speculate about the answers to these questions, but imagine if the technology was evaluated with users who differed from the developers in terms of skin color and tech-savviness interesting findings regarding usability of the system would emerge.

Broadly, my research indicates that evaluation studies can be used uncover value differences between researchers/designers and the people who interact with their work.

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[12] "Microsoft's Skinput turns hands, arms into buttons": http://www.cnn.com/2010/TECH/04/19/microsoft.skinput/index.html

Thus, my research provides the community an additional way to conceptualize evaluation studies, indeed, they can uncover more than usability problems. Historically ICT evaluation studies are used to surface "usability bugs," validate design ideas or to determine which application is better at certain things (Greenberg & Buxton, 2008). Standpoint theory offers practical guidance for a community that continues to debate how designers' values are embedded in design and a new way to conceptualize evaluation studies. Rather than uncovering "usability bugs" or determining whether or not an application is acceptable, evaluation studies can be useful in uncovering assumptions the HCC community has about users. For example, the rejection of ChurchShare highlighted ways that digital photography is not changing photo sharing practices for some users, a finding consistently reported in HCI research. Debating and understanding these differences becomes increasingly important as the community begins to explore ICT use in setting where non-western value systems prevail.

Researchers' Standpoints and HCC Research: HCC researchers generally omit considerations of their standpoint from discussions of their study design and research methodology, like researchers in other fields (Pargament et al., 2000). Perhaps computer scientists are hesitant to consider how their identity shapes their work because it could open them to criticism about lack of bias in their work. Recent research suggests a majority of American scientists and researchers (at elite universities) describe themselves as religious, but tend to keep their faith "closeted" at work because they are concerned they will be viewed as politically conservative and sense there is a bias towards open discussion about religion at their institutions (Ecklund, 2009; Eklund & Scheitle, 2007).

Eklund contends that scientists should be open about their faith because academics are thought leaders and shape the perceptions of future generations through the students they teach. Over the course of my dissertation I engaged in discussions about religions with my colleagues and found that it offers me a new perspective on their research and what motivates them to pursue the topics they study. Thus, inline with my broader argument that standpoint theory has much to offer HCC research, I contend that researchers should unveil the assumptions and motivations underlying their work. As an initial way of prompting discussion about researchers' standpoints in HCC I propose that researchers ask themselves the following questions before embarking on a project:

1) What assumptions and preconceived views do we bring to users under study?

2) How do these assumptions affect "needs" finding in user research?

3) Why do we assume ICT are useful in responding to these needs?

4) How does your context shape your work? By context I am referring to factors such as conference or product launch deadlines.

In Anthropology, much attention is devoted to understanding the role of the researcher in the creation of knowledge. HCC researchers have borrowed from Anthropology in the past; the most notable example of this is the widespread use of ethnography in user studies. As HCC progresses I hope researchers will appropriate other approaches from other fields, such as standpoint theory because it can improve the communities' understanding of how to develop ICT for marginalized users and, as I suggest, lead to stronger objectivity in evaluation studies.

7.1.3 Limitations of Standpoint Theory and Future Directions

Throughout my dissertation I characterize Kenyan immigrants as understudied and marginalized. I use standpoint theory to argue that by deploying ChurchShare with

these users I generated more relevant results, or results that are more objective than findings from my original deployment study. Although, standpoint theory has much to offer HCC, it highlights controversial issues that I discuss in this section.

As previously noted, I consistently refer to Kenyan immigrants as marginalized in HCC research. In the process of doing this, I highlight a significant flaw of standpoint theory. Specifically, I reduce the multiple people I interviewed and observed to a homogenous whole. The tremendous diversity within this user group is lost in my characterization of them as marginalized. Further, my findings offer little evidence as to whether or not participants in my research saw themselves as marginalized. Labeling Kenyan immigrants as such, replicates the power hierarchies I want to question in ICT evaluation studies. As other scholars note, simply acknowledging that power differences exist in research does not change them (McCorkel & Myers, 2003).

Finally, by referring to participants in the second deployment as marginalized, I obscure the ways American-born participants are marginalized. I argue these participants share characteristics that are common to individuals who are the targets of computing research and development (e.g., in terms of familiarity with ICT and country of origin). However, my formative research focused on an aspects of these participants' identities that is understudied in HCC—their Christian faith. In turn, my characterization also obscures how Kenyan immigrants are not marginalized. Indeed, many of those interviewed described themselves as "privileged" because they had the opportunity to come to the U.S. to pursue an education or to find a more lucrative job than they could find in Kenya. Thus a limitation of my use of standpoint theory (and other researchers'

use of the theory) is that I do little to recognize participants' multiple identities and how they affect findings reported in my dissertation (Haraway, 1988).

Another limitation of my approach is that I offer no empirical evidence indicating HCC researchers' standpoints do, indeed, affect what user groups are excluded in evaluation studies. This assertion is guided my assumptions and experiences as an active member of various HCC research communities. I have attended the ACM Conference on Human Factors in Computing Systems (CHI), the premier international conference on human-computer interaction, every year since 2003. Further, I attended two of the leading research universities in the field and interned at research labs focused on HCC issues.

A worthwhile future research endeavor would be to systemically investigate user studies published in the proceedings of CHI. This project would involve creating a corpus of papers on user studies in HCI by searching the ACM Guide to Computing Literature for the term "user studies;" summarizing these papers (focusing on users described in the papers); and coding these summaries for insights into how the research communities defines "users." This approach to research has led to successful publications in the field such as "Mapping the Landscape of Sustainable HCI" (DiSalvo, Sengers & Brynjarsdóttir, 2010).

7.4 Conclusion

I began this dissertation asking the following question: How do user groups who are traditionally overlooked in computing research use ICT differently from users who are the targets of computing research and development? An understanding that HCC researchers and ICT developers arguably assume users are like them, or I-methodology,

motivated this question. Those charged with developing and researching ICT are largely white, born in western countries and highly educated. Thus these individuals vastly differ from those who interact with ICT. The differences between designers and user will likely increase as the community explores how to design computing applications for users in developing countries

I used religion as a lens to understand differences between ICT designers and the people they design for, because it remains a topic that is central to many peoples' lives, but is overlooked in HCC. Religion also prompted me to explore marginalized user groups, such as Kenyan immigrants. Indeed, it is these users who differ from those charged with developing technology and who have not been the traditional targets of ICT research and development.

I conducted a series of formative studies with megachurch leaders and attendees. These studies uncovered various ways religions affects technology adoption and contributed to HCC research communities' knowledge about how to design ICT for religious purposes. Findings from these formative studies also motivated a technology probe call ChurchShare. The probe was deployed in two churches comprised of different members. The initial deployment took place with ideal users, or those I imagined would use the application. Members of this church used ChurchShare in ways I claimed they would. Specifically, they took pictures depicting God's presence in their lives and uploaded more than 200 photos to the website. The images were projected in their church and allowed members who did not submit photos to learn more about church members who submitted images.

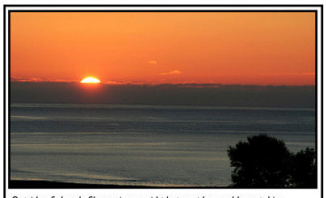
ChurchShare was completely rejected in the second church; zero pictures were sent to the website. Although this deployment could be defined as a failure, I contend it was more successful than the deployment where the probe was used. Learning why Kenyan immigrants rejected ChurchShare forced me to reflect on the assumptions embedded in my research approach and technology probe. Standpoint theory provided a useful way for me to make sense of this experience and one that I hope will shape future ICT evaluation studies.

APPENDIX A: CHURCHSHARE STORYBOARD

Church-Share.com

A photo-sharing site that promotes communal co-creation of worship media and encourages social fellowship in megachurches.

Sharon is a member of Lakewood Baptist Church. She enjoys attending every Sunday, but wants to be more active in worship services and meet more of the new parishioners joining Lakewood's congregation.

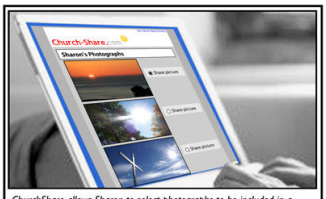


Outside of church, Sharon is an avid photographer and loves taking pictures outdoors.

She views nature as one of God's greatest creations and enjoys capturing meaningful outdoor moments with her digital camera.

Sharon browses her church's website everyday to learn about upcoming events and receive a daily devotional. She also uses ChurchShare, a photo-sharing site affiliated with Lakewood.

She will frequently upload some of her favorite photographs to the site to share with other laity.



ChurchShare allows Sharon to select photographs to be included in a presentation made prior to worship services on Sundays.

Rod is Lakewood's "Director of Contemporary Worship." His job includes preparing the new media (e.g., photographs, videos, and graphics) to be used during the pastor's sermon on Sundays.

Prior to services he looks at ChurchShare and downloads pictures laity have decided to share during Sunday worship services. He puts these photographs into a PowerPoint™ presentation.

The presentation plays in a loop during 15 minutes prior to, and after, worship services.

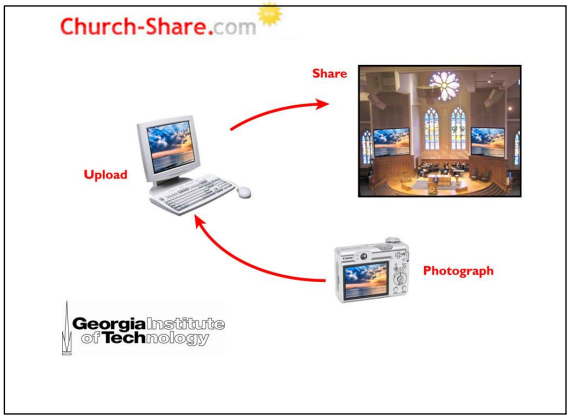
Photographs are tagged with the profile picture and name of the person who took them.

Steve is new to Lakewood. He enjoys watching the presentation of laity's photographs prior to services. Sharon's picture reminded him of a meaningful sunset he witnessed yesterday.

He wrote down her name and made an effort to find her after services to share this with her.

APPENDIX B: SLIDES FROM PRESENTATION

ANNOUNCING STUDY AT U.S. BORN CHURCH



APPENDIX C: EMAIL MESSAGE SENT TO U.S. BORN CHURCH MEMBERS

Hi, I am a Ph.D. student in GaTech's College of Computing. For the past 4 years, I have explored religion and technology. I began by interviewing pastors at local churches about technology use and then conducted interviews with church members about the same thing. Findings from these studies motivated ChurchShare, a photo-sharing website that allows church members to take digital photographs and share them with others during church worship services (http://www.church-share.com/) <http://www.church-share.com>. *To complete my dissertation I want to see what happens when church members use the website and hope you can help me do this.*

Participation involves taking *digital photographs of God's presence in your everyday life*. This may include pictures of the sun setting, your family, or anything that reminds you of God.

Here are examples posted by others: http://www.Flickr.com/groups/gods_creation/.
<cid:part1.06060902.07080403@cc.gatech.edu>

If you choose to participate, your photographs will be projected in the cafe 15-20 minutes before Sunday worship services. Your name will also appear on the photographs you submit.

*I will donate $0.10 to Marietta Vineyard for every photograph I receive. *

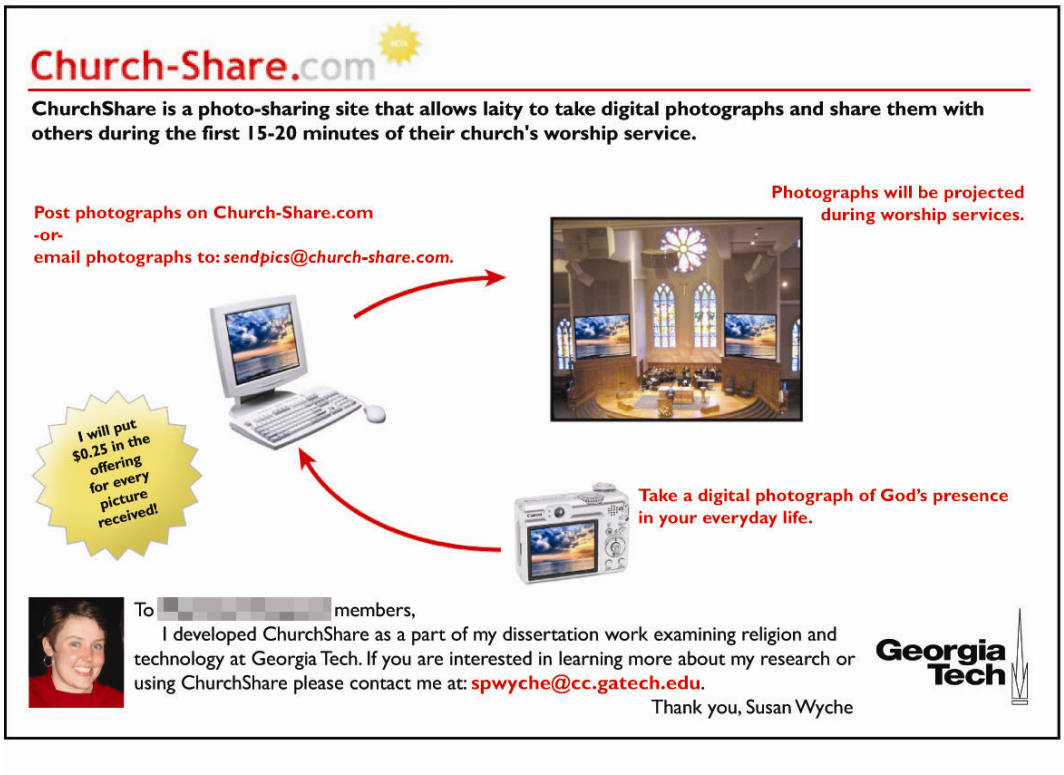
This Sunday (12/6) I will hand-out digital cameras to those interested in participating. For those with their own cameras there are *two ways you can submit photographs*. The first is sending them to the following email address: *_sendpics@church-share.com <mailto:sendpics@church-share.com>_
-or-
If you are interested in seeing others photographs you can post them onto the ChurchShare website (http://www.church-share.com).
**
Here is information about accessing the site: *
-Visit the site: http://www.church-share.com <http://www.church-share.com>
-In the "Login Box" click on "New Member" (located in the lower right hand corner of the box)
-Enter the required information, "First Name," "Last Name," and "Email."
-In the "Password" box please enter a password and re-renter it in the "Confirm Password" box.
-Click on the "Choose Church" and select ****Marietta Vineyards**
-In the Passcode Box please enter "mvineyards" "Register"
-Once you have registered you can post pictures on the site by clicking on "My Photos" in the webpage's upper right-hand corner. I have already put some online to give you an idea of what type of images may be appropriate. Feel free to post pictures you have recently taken or existing ones. The most important things is to post images you would like to share with others during worship service. Once we get enough pictures we will display them during church services.

Please contact me if you want to know more about my research or are interested in participating. Thank you for your help and I look forward to seeing your photographs.

Sincerely,

Susan Wyche, Ph.D. Candidate
Georgia Institute of Technology
spwyche@cc.gatech.edu

APPENDIX D: FLYER ANNOUNCING STUDY AT U.S. BORN CHURCH



APPENDIX E: EMAIL MESSAGE SENT TO KENYAN CHURCH MEMBERS

Dear KACC members,

Thank you for helping me with my dissertation work. Special thanks to those who have participated in interviews. I would like to collect photographs of God's presence in your everyday life to help me with my research. Pictures may include the sun setting, your family, or anything else that reminds you of God.

Here are examples posted by others: http://www.Flickr.com/groups/gods_creation/ <http://www.Flickr.com/groups/gods_creation/>.

If you choose to send me photographs they will be projected in the sanctuary 15-20 minutes after Sunday worship services. Your name will also appear on the photographs you submit.

I will donate $0.10 to KACC for every photograph I receive.

There are two ways you can send me photographs.* The first is sending them to the following email address: *_sendpics@church-share.com <mailto:sendpics@church-share.com> _*
-or-
You can bring them to church worship on Sunday and I can download them from your digital camera onto my computer.

Feel free to send pictures you have recently taken or existing ones. The most important thing is to post images you would like to share with others during worship service. Once we get enough pictures I will display them following church services.

Please contact me at spwyche@cc.gatech.edu <mailto:spwyche@cc.gatech.edu> if you have questions.

Asanti Sana,
Nyaguthie

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